

2023-2028 Tactical Integrated Forest Management Plan

Nord-du-Québec Region

Management Unit 087-51

Management Unit Quevillon (107)

MINISTÈRE DES RESSOURCES NATURELLES ET DES FORÊTS



Produced by

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Ministère des Ressources naturelles et des Forêts
Legal deposit - Bibliothèque et Archives nationales du Québec, 2023

ISBN (PDF): 978-2-550-92574-3

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1. Sustainable Forest Management Objectives

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

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

1.1 SUMMARY OF FOREST MANAGEMENT ISSUES AND OBJECTIVES

The issues are assessed and documented in the companion document “Analysis of Issues”. When selected, they are translated into sustainable forest management objectives to be taken into account in forest planning. The forest management objectives are tracked in the form of targets¹ associated with a given indicator or actions to perform. Table below presents all of the issues selected for the Management Unit and the objectives to be achieved.

| |
|--|
| To learn more, consult: PAFIT |
|--|

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

Table 1 : Summary Table of Forest Management Objectives by Issue

| Issues | Objectives | Indicator/Action | Target | Scale | Periodicity |
|--------------------------|--|--|---|-------|--------------|
| Ecological issues | | | | | |
| Age Structure | Ensure that the age structure of the managed forests is similar to the one that existed in the natural forest. | Area occupied by TAUs showing a low or moderate degree of alteration. | > 80% by the year 2068 | MU | Quinquennial |
| Spatial organization | Maintain or restore the key attributes related to the spatial organization of the natural forests. For more details about the means to achieve the objective, see issue-solution sheet 1.06.1 | Number of years to complete a first or second passage. | < 10 years | SOC | Quinquennial |
| | | Area occupied by SOC's in the forest state. | > 20% | MU | Quinquennial |
| | | Are covered by an area of influence of 10 km around SOC's in the forest state. | > 90% | MU | Quinquennial |
| | | Productive area in stands 7 m or taller. | > 30% | SOC | Annual |
| | | Productive area in stands 7 m or taller organized in residual forest blocks | > 20% | SOC | Annual |
| | | Reference area located within 600 m of the limit of a residual forest parcel or block | > 80% | SOC | Annual |
| | | Reference area located within 900 m of the limit of a residual forest parcel or block | > 98% | SOC | Annual |
| | | Productive area after harvesting in stands 7 m or taller of each major type of forest cover | > 20% | SOC | Annual |
| | | Width of strip of woodland with at least 70% of the stands 3 m or taller to be maintained for juxtaposition with the aggregated cut blocks. | > 1 km | SOC | Annual |
| Vegetation Composition | Ensure that the vegetation composition of the managed forests approaches that of the natural forest. | Rate of alteration of the area occupied by type of cover. For more details on the means to achieve the objective, see the attached issue-solution sheets 1.01.1 (action to constrain leaf thinning) and 1.01.3 (promoting White Spruce). | Maintain or gradually attain a low or moderate degree of alteration ($\pm 60\%$ of the baseline level) | MU | Quinquennial |
| Internal Structure | Ensure that the internal structure of the managed forests is similar to that of the natural forest and maintain attributes of complexity. | Rate of alteration of the area occupied by irregular stands. For more details about the means to achieve the objective, see attached issue-solution sheet 1.02.1 | Maintain or gradually attain a low or moderate degree of alteration ($> 30\%$ of the baseline level) | MU | Quinquennial |

| Issues | Objectives | Indicator/Action | Target | Scale | Periodicity |
|---------------------------------|--|--|-------------------------------|----------------------------|--------------|
| | | Area treated by retention harvesting of at least 5% of the merchantable volume. For more details about the means to achieve the objective, see attached issue-solution sheet 1.03.1 | > 40% of the clearcuts (CT) | MU | Annual |
| | | 10-to-25-year area that has received training treatment in the past five years without special conditions. For more details about the means to achieve the objective, see attached issue-solution sheet 1.04.1. | < 50% | Unit of analysis (hexagon) | Annual |
| Riparian Environments | Present the rare types of natural communities and a representative portion of riparian diversity | Area of the completely protected riparian environment. | > 15% | MU | Quinquennial |
| Wetlands | See to the maintenance of the ecological function of high-value wetlands and isolated wetlands. | Area of the wetlands included in a protected area, administrative protection or an area proposed as wetlands of interest (WLI). | 1% | MU | Quinquennial |
| Timber Production Issues | | | | | |
| Accessibility | Maintain or develop accessible roads allowing to increase the areas dedicated to development | Regional allowable cuts/volumes with permits for plants in the region. | Status (monitoring) indicator | Region | Quinquennial |
| | | Areas of silvicultural work of the Forest Development Strategy. | Ha per treatment | MU | Quinquennial |
| Mortality | Reduce the risk of mortality associated to natural disturbances and climate changes | Regional allowable cuts/volumes with permits for plants in the region. | None | Region | Quinquennial |
| | | Percentage of annual monitoring operations on the schedule of the tactical plans. | 100% | MU | Quinquennial |
| | | Percentage of managed areas according to an intensive silviculture gradient. | 10% | Management Unit (UG) | Quinquennial |
| | | Areas of silvicultural work of the Forest Development Strategy. | Ha per treatment | MU | Quinquennial |
| | Maintain or increase forest yields | Regional allowable cuts/volumes with permits for plants in the region. | None | Region | Quinquennial |

| Issues | Objectives | Indicator/Action | Target | Scale | Periodicity |
|---------------------------------|--|---|-------------------------------|----------------------|--------------|
| Productivity in desired species | Achievement of the targeted production objectives | Percentage of annual monitoring operations on the schedule of the tactical plans. | 100% | MU | Quinquennial |
| | | Percentage of managed areas according to an intensive silviculture gradient. | 10% | Management Unit (UG) | Quinquennial |
| | | Areas of silvicultural work of the Forest Development Strategy. | Ha per treatment | MU | Quinquennial |
| Characteristic quality sought | Maintain or increase the composition and quality of the stands | Consumption of plants in the region/Regional allowable cut | None | Region | Quinquennial |
| | | Percentage of annual monitoring operations on the schedule of the tactical plans. | 100% | MU | Quinquennial |
| | | Percentage of managed areas according to an intensive silviculture gradient. | 10% | Management Unit (UG) | Quinquennial |
| | | Areas of silvicultural work of the Forest Development Strategy. | Ha per treatment | MU | Quinquennial |
| Financial Profitability | Increase the value of harvested wood and control dispersal costs | Consumption of plants in the region/Regional allowable cut | Status (monitoring) indicator | Region | Quinquennial |
| | | Percentage of managed areas according to an intensive silviculture gradient. | 10% | Management Unit (UG) | Quinquennial |
| | | Areas of silvicultural work of the Forest Development Strategy. | Ha per treatment | MU | Quinquennial |
| Regional of Local Issues | | | | | |
| Ericaceous Plant | Maintain the productivity of the forest ecosystems susceptible to invasion by ericaceous plants. | Ratio of harvested stands susceptible to invasion by ericaceous plants that underwent a forestry operation adapted to the issue. For more details about the means to achieve the objective, see attached issue--solution sheet 2.01.1. | 60% | MU | Quinquennial |
| Wildlife Habitats | Consider the habitat needs of the species sensitive to forest management. | For more details about the means to achieve the objective, see attached issue-solution sheets 1.07.1, 1.05.1 and 3.02.2. | | | |

1.2 SYNERGIES AMONG THE ISSUES DEPENDING ON THE SOLUTIONS ADOPTED

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

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

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

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

1.2.1 EXCLUSION

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

Table 3 : Exclusion Types

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

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

1.2.2 ADAPTED SILVICULTURAL TREATMENTS

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

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

Table 4: Types of cuts

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

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

Table 5: Site and Artificial Regeneration Treatments

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

Table 6: Stand Tending Treatments

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

1.2.3 SPATIAL AND TEMPORAL DISTRIBUTION OF INTERVENTIONS

Distributing the silvicultural work 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 Forest 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.

Table 7: Spatial and Temporal Conditions

| Issues | Compartment of spatial organization (SOC) | Territorial unit of analysis (TAU) | Lengthening of the revolution or the rotation |
|----------------------|---|---|---|
| Age structure | | Degree of alteration of old-growth forests and regenerating forest (restoration periods ¹). | Maintenance of recruitment of old-growth forests |
| Spatial organization | <u>Black Spruce</u> - Distribution of key forest areas - Harvesting priority | | |
| Composition | | | Maintenance of increasingly rare species (White Spruces and Eastern White Cedar). |
| Internal structure | Irregular shelterwood cutting site Presence or rarity of “operational” biological legacies | Priority of maintenance or restoration of irregular stands | |
| Wetlands | Strip of woodland on the edge of a wetland of interest < 100 ha or an isolated wetland | | |
| Timber quality | Potential for intensive silviculture | | |
| Landscape | Virtual supervision around sensitive sites recognized by the TGIRT. | | |
| Natural disturbance | | | Avoid stands vulnerable to SBW. |

2. Integrated Forest Development Strategy

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

2.1 HARVEST DISTRIBUTION

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

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

2.2 SILVICULTURAL STRATEGY

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

The silvicultural scenario defines the guidelines (the silvicultural objectives) that the forest manager wishes to apply to a given group of strata and the sequence of treatments to achieve this. They are developed on the basis of the target composition, the regeneration process according to the desired structure, and the potentially applicable intensity gradient. Analyses pertaining to the economic profitability of the silvicultural scenarios, the risks that can limit the achievement of the forest management objectives and the impact of the silvicultural choices on maintenance of the allowable cuts in the long term are also produced in view of guiding forest engineers in their decisions, depending on the means at their disposal (budget, operational capacity, etc.).

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

Target composition

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

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

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

Regeneration Processes

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

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

Silvicultural Intensity Gradient

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

| Intensity Gradient | Description ¹ | Associated Treatments ² |
|--------------------|---|---|
| Extensive | The stand is managed exclusively by means of natural regeneration with regeneration processes of the clearcutting family. The predetermined regeneration is protected by natural seeding on appropriate germination beds, created during the harvest and during land preparation. | Clearcutting Scarification |
| Basic | The interventions are oriented to management of the composition of the stand. To increase the yield of desired species, canopy management treatments may be used. Resorting to reforestation or artificial seeding only occurs when natural regeneration is insufficient or when the regeneration present is not part of the desired species. The subsequent silvicultural efforts have the goal of favouring the species to be promoted and managing the species to be controlled, without resorting to phytocides. There may also be sanitation to improve the health of a stand. | Shelterwood cutting Fill planting Basic planting Clearing Cleanup |

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

² For more information on the treatments adopted in the silvicultural strategy, see the definitions in the appendix.

| Intensity Gradient | Description ¹ | Associated Treatments ² |
|--------------------|---|---|
| Intensive | Interventions for the purpose of increasing growth and improvement of the characteristics (quality) of selected trees of desired species. Intensive silviculture is also distinguished from basic silviculture by management of intraspecific competition over time (e.g. regularize the spacing between the crop trees of the same species). | Intensive planting Precommercial thinning Commercial thinning |

2.2.1 ECONOMIC PROFITABILITY ANALYSES

The economic profitability analysis is a decision help tool that allows consideration of the economic aspect in forest management. Its objective is to assess whether a specific investment is profitable for society. It is interested in the total revenues and costs for all economic agents of society, without a concern for knowing who pays and who receives. In the forest management context, the economic profitability analysis seeks to measure the wealth creation level generated by an investment in different silvicultural scenarios.

To learn more, consult:

[Guide d'analyse économique appliquée aux investissements sylvicoles](#)

2.2.1.1 Economic Profitability Analyses Results

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

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

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

social and community issues and on the timber flow and products generated. An economically profitable silvicultural scenario could be preferred, because it responds better to all the issues to be considered.

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

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

Table 8: Classification of Indicator Values

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

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

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

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

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

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

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

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

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

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

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

The main findings of the economic analyses pertained to:

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

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

2.2.2 RISK ASSESSMENT

Several factors of natural or anthropogenic origin may affect the health of forests, timber production and forest yields. It is therefore important to do a good analysis of the risks that may hinder the achievement

of the forest management objectives and to propose mitigation measures, as needed, to mitigate the potential effects of these risks.

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

2.2.2.1 Risk evaluation

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

Table 10: Assessment of Probabilities of Occurrence of a Risk

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

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

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

Table 12: Risk Categories

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

Table 13: Risk Assessment Matrix

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

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

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

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

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

2.2.2.2 Social unacceptability of interventions

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

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

2.2.2.3 Anticipated forecast not achieved

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

2.2.2.4 Change of vocation of the territory (public forest)

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

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

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

2.2.2.5 Wind gust, windthrow

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

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

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

2.2.2.6 SBW epidemic

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

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

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

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

2.2.2.7 Fire

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

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

All the scenarios of the Forest Development Strategy are therefore the subject of a risk assessment. The risk is extreme. The probability of occurrence falls within the "possible" class and the impact falls within the "catastrophic" class. Apart from the special salvage plans that are elaborated, dispersing the silvicultural interventions turns out to be the mitigation measure to prefer in order to reduce the impacts.

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

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

2.2.3 SILVICULTURAL SCENARIOS AND FOREST MANAGEMENT LEVELS

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

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

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

| Forest cover types | Forest station group | Forest types | Species to be promoted | Extensive | | Basic | | | | Intensive | | |
|--------------------|----------------------|--------------|------------------------|-----------|---------|----------|--------------|------------------|--------------|------------------|---------------|---------------------|
| | | | | CPRS | CPIL-CT | NET-CPRS | SCA-PLb-CPRS | SCA-PLb-DEG-CPRS | SCA-REG-CPRS | SCA-REG-NET-CPRS | (EPC)-EC-CPRS | SCA-PLi-DEG-EC-CPRS |
| F | RFiF | BpFx | BpFx | X | | | | | | | | |
| | | PeFx | PeFx | X | | | | | | | | |
| | RFiM | PeFx | PeFx | X | | | | | | | | |
| MF | RFiF | BpRx | BpFx | X | | | | | | | | |
| | | | SbFx | | | X | | | | | | |
| | | BpRx | X | | | | | | | | | |
| | | PeRx | X | | | | | | | | | |
| | RFiM | BpRx | BpRx | X | | | | | | | | |
| | | | EpFx | | | | | | X | | | |
| | | PeRx | EpFx | | | X | | | | | | |
| | | PeRx | PeRx | X | | | | | | | | |
| MR | RESR0 | EpFx | EpFx | X | | | | | | | | |
| | RFiF | EpFx | Ep | | | | X* | | | | | |
| | | | Epb | | | | | | | X* | | |

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

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

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

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

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

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

| Forest types | | | |
|--------------------------|---|------|----------------------------|
| BpFx | White Birch-hardwood stands | Pg | Jack Pine stands |
| BpRx | White Birch-softwood stands | PgFx | Jack Pine-softwood stands |
| Ep | Spruce stands | PgRx | Jack Pine-softwood stands |
| EpFx | Spruce-hardwood stands | Sb | Balsam Fir stands |
| EpRx | Spruce-softwood stands | SbFx | Balsam Fir-softwood stands |
| PeFx | Poplar-hardwood stands | SbRx | Balsam Fir-softwood stands |
| PeRx | Poplar-softwood stands | | |
| Silvicultural treatments | | | |
| CPIL | Slow regeneration irregular shelterwood cutting | EC | Commercial thinning |
| CPRS | Shelterwood cutting with regeneration and soil protection | Pli | Intensive planting |
| CT | Clearcutting | PLb | Basic planting |
| DEG | Clearing | REG | Fill planting |
| NET | Cleanup | SCA | Scarification |
| EPC | Precommercial thinning | | |

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

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

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

| | 8751 | |
|---|-------------|-------------------|
| Commercial treatments | (ha) | (%) of CR* |
| Cutting with protection of regeneration and soils (without retention) | 2124 | N/A |
| Cutting with protection of regeneration and soils (with variable retention)** | 1416 | 40% |
| Total for régénération cutting (CR) * | 3540 | N/A |
| Commercial thinning | 50 | N/A |
| Irregular shelterwood | 150 | N/A |
| Total for partial cutting (CP) | 200 | N/A |
| Total for commercial treatments (harvest) | 3740 | N/A |
| Non commercial treatments | | |
| Partial scarification | 150 | 4% |
| Full scarification | 1580 | 45% |
| Total for field preparation | 1730 | 49% |
| Ligniculture (fast growing species) | 0 | 0% |
| Intensive tree planting (2 000 trees/ha) | 80 | 2% |
| Basic tree planting (1 600 trees/ha) | 1500 | 42% |
| Tree planting infilling (regarni) | 0 | 0% |
| Total for tree planting | 1580 | 45% |
| Cleaning and brush cutting in natural regeneration stand | 330 | N/A |
| Precommercial thinning | 0 | N/A |
| Plantation clearing | 180 | N/A |
| Pruning (élagage) | 0 | N/A |
| Total for tending treatments (travaux d'éducation) | 510 | N/A |
| Total for non commercial treatments | 3820 | N/A |

* Achievement of the target of variable retention harvesting, planting and field preparation is evaluated according to a proportion of the area treated on the regeneration section (CR)-the forest stands with a majority of species without an industrial taker are removed from total.

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

Wood production strategy - Potential specific targets

| | 8751 | |
|--|-------------|-------------------|
| Traitements commerciaux | (ha) | (%) of CR* |
| Commercial thinning | 300 | N/A |
| Intensive tree planting (2 000 trees/ha) | 345 | 10% |
| Basic tree planting (1 600 trees/ha) | 1255 | 35% |

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

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

| | 8751 | | |
|---|---------------|--------------------|-------------------|
| Commercial treatments | Target (ha) | Done (3 yrs*) (ha) | Done / Target (%) |
| Cutting with protection of regeneration and soils (without retention) | 10111 | 4053 | 40% |
| Cutting with protection of regeneration and soils (with variable retention)** | 6740 | 3562 | 53% |
| Cutting with protection of regeneration and soils (2012 à 2017)*** | NA | 7030 | 0% |
| Total for régénération cutting (CR) * | 16851 | 7615 | 45% |
| Commercial thinning | 215 | 0 | 0% |
| Irregular shelterwood | 898 | 704 | 78% |
| Total for partial cutting (CP) | 1 113 | 704 | 63% |
| Total for commercial treatments (harvest) | 17 964 | 8 319 | 46% |
| Non commercial treatments | | | |
| Field preparation | 8142 | 4294 | 53% |
| Tree planting | 7436 | 5584 | 75% |
| Tending treatments (travaux d'éducation) | 2550 | 2624 | 103% |
| Total for non commercial treatments | 18 128 | 12 502 | 69% |

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

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

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

The distribution of the costs incurred by the State for the execution of the Forest Development Strategy of 1,859,000 million dollars a year. It is taken from the allowable cut calculation determination booklets (<https://forestierenchef.gouv.qc.ca/possibilites-forestieres/periode-2023-2028/>)

MU 08751: Annual silvicultural budget for the 2023-2028 period: \$1,859,000

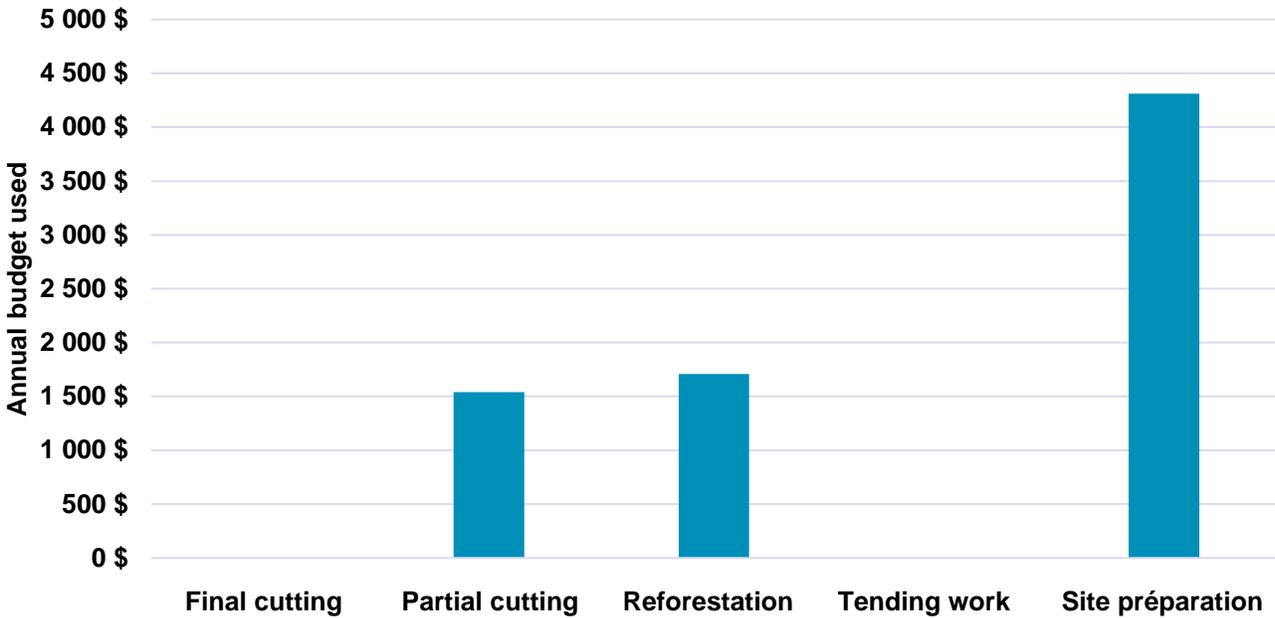


Figure 1: Distribution of the Annual Budget Used for the 2023-2028 Period – MU 08751

2.2.4 AREAS OF INCREASED TIMBER PRODUCTION

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

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

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

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

For the Forest Management Units of the Nord-du-Québec region, as permitted by the Québec Timber Production Strategy, a flexible approach regarding intensification if silviculture has been deployed to meet the expectations of the regional partners. In this Tactical Integrated Forest Management Plan (PAFIT), there are no AITPs identified, but rather potential silviculture intensification areas serving to assist in decision-making for forest managers. The forest users will be able to share their concerns regarding the intensification of forest management annually in the Operational Integrated Forest Management Plans (PAFIO). This increased flexibility should also be advantageous in dealing with certain uncertainties, such as natural disturbances or the effects of climate change.

For the distribution of potential areas of intensification of silviculture in the Nord-du-Québec region, consult the layer of potential areas of intensification of silviculture:

https://operationsregionales.mffp.gouv.qc.ca/APPLICATIONSWEB/R10/017_CI_juillet_2019_ccqf/

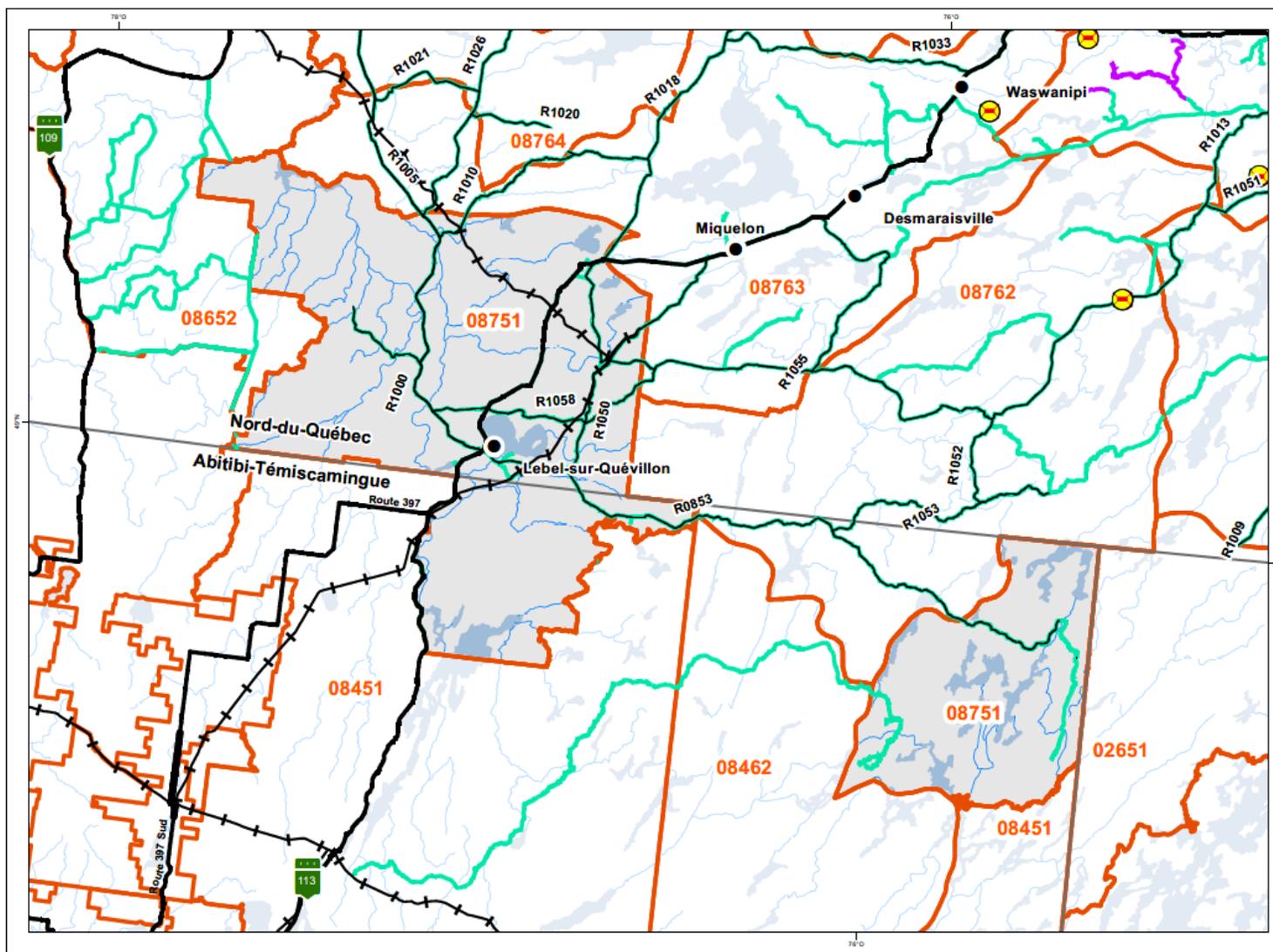
2.3 INFRASTRUCTURES AND MAIN ROADS TO DEVELOP AND MAINTAIN

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

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

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

Management units : 08751



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

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

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

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

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

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

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

Each closing project then will follow the normal process, as provided in the guide to [multipurpose road closing requests](#).

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

2.4 ALLOWABLE CUTS

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

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

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

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

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

To learn more, consult:

[Manuel de détermination 2023-2028](#)

Thus, according to the Integrated Forest Development Strategy and the forest management objectives established by the Direction de la gestion des forêts du Nord-du-Québec, the Chief Forester proceeded in December 2021 to determine the allowable cuts of the MU 08751. This plan, in section 2.4.3, specifies silvicultural work levels in concordance with the allowable cut calculation performed by the Chief Forester. It should also be noted that a new allowable cut calculation was not produced for MU 085-62, 086-52 and 087-51. These allowable cuts are based on the previous period and received updates and adjustment recommendations.

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

[Allowable cuts - Bureau du Forestier en chef \(gouv.qc.ca\)](https://forestierenchef.gouv.qc.ca)

[https://forestierenchef.gouv.qc.ca/possibilites-forestieres/periode-2023-2028/regions-forestieres-2023-2028/nord-du-quebec-2023-2028/.](https://forestierenchef.gouv.qc.ca/possibilites-forestieres/periode-2023-2028/regions-forestieres-2023-2028/nord-du-quebec-2023-2028/)

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

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

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

| | | 8751 | |
|--|------|--------|---------------------------|
| | Unit | Target | (%) harvested area* |
| MAJOR FOREST TYPES | | | |
| Softwoods | ha | 2836 | 76% |
| Hardwoods | ha | 738 | 20% |
| Mixed stands with a dominance of hardwood | ha | 166 | 4% |
| Mixed stands with a dominance of softwood | ha | 0 | 0% |
| OPERATIONAL CONSTRAINTS | | | |
| Visual framing | ha | 123 | 3% |
| Orphan stand | ha | 529 | 14% |
| Steep slopes | ha | 8 | 0% |
| Riparian buffer*** | ha | N/A | N/A |
| Wood dimension (SEPM) lower 85 dm ³ /stem | ha | 133 | 4% |
| HARVESTED AREA* | | | |
| Harvested area (CR+CP) | ha | 3740 | N/A |

* Major forest types and operational constraints targets achievement are evaluated according to a proportion of the harvested area on the total harvested areas (partial and regeneration). The harvested areas include planned put unharvested areas.

*** Riparian buffers are now excluded from the annual allowable cut calculation

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

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

| | | 8751 | | |
|--|------|--------|---------------|-------------------|
| | Unit | Target | Done (3 yrs)* | Done / Target (%) |
| MAJOR FOREST TYPES | | | | |
| Softwoods | ha | 13623 | 6714 | 49% |
| Hardwoods | ha | 3544 | 1170 | 33% |
| Mixed stands with a dominance of hardwood | ha | 798 | 172 | 22% |
| Mixed stands with a dominance of softwood | ha | 0 | 48 | 0% |
| OPERATIONAL CONSTRAINTS | | | | |
| Visual framing | ha | 590 | 535 | 91% |
| Orphan stand | ha | 2543 | 955 | 38% |
| Riparian buffer | ha | 38 | 3 | 8% |
| Steep slopes | ha | 539 | 202 | 37% |
| Wood dimension (SEPM) lower 85 dm ³ /stem | ha | 639 | 0 | 0% |
| HARVESTED AREA* | | | | |
| Harvested area (CR+CP) | ha | 17965 | 8177 | 46% |

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

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

2.5 MONITORING

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

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

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

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

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

To govern the performance of forest monitoring, a monitoring schedule was developed based on the type of intervention, the silvicultural intensity gradient, the maximum monitoring period and the thresholds to consider that the silvicultural objectives are achieved. Below is the table 21 developed:

Table 21: Effectiveness Monitoring Schedule (R15.1)

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

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

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

Table 22 illustrates the minimum targets according to the type of monitoring and the silvicultural intensity gradient concerned.

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

Table 22: Minimum Targets (Basic Criteria of Forest Monitoring Operation R44.0)

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

| 2 nd effectiveness monitoring operation | Silvicultural intensity gradient | | |
|--|----------------------------------|---|---|
| | Extensive | Basic (target density of 1600 well distributed stems/ha) | Intensive (target density of 2000 well distributed stems/ha) |
| Methods | N.A. | Classification of aerial images and/or photo-interpretation and/or field reconnaissance <u>and if actions are required</u> : Intervention inventory | Production of an inventory |
| Minimum targets | N.A. | 60% distribution coefficient in desired species free to grow | 75% distribution coefficient in thinned desired species |
| Actions to be taken if the target is not achieved | N.A. | Actions required, if possible | Actions required |

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

3. Professional and Administrative Signatures

Ressources naturelles
et Forêts



(Only the original French version is signed)

Professional and Administrative Signature Form

Tactical Integrated Forest Management Plan

Forest Management Unit 087-51

Professional responsibility

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

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

Date _____

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

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Date _____

David Gagnon, ing.f. no de permis 11-010
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Date _____

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Aménagiste pour la planification non-commerciale

Date _____

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

Sonia Légaré, biologiste PH.D.

Date _____

Administrative responsibility

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

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

Date _____

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

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

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

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

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

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

Lebel-sur-Quévillon

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

Tableau des enjeux



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

APPENDIX C – DEROGATION FOR BALSAM FIR STAND TRUS 085-51, 086-52, 087-51

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

Unités d'aménagement 085-51, 086-52 et 087-51 - Région Nord-du-Québec

Date : 1^{er} août 2022

MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS



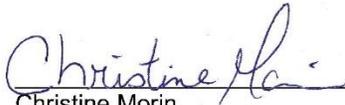
Votre
gouvernement

Québec



Approbation

Direction de la gestion des forêts du Nord-du-Québec



Christine Morin

Directrice régionale par intérim

1^{er} août 2022

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Ministère des Forêts, de la Faune et des Parcs

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Ministère des Forêts, de la Faune et des Parcs

Liste des sigles et acronymes

COS : compartiment d'organisation spatiale

LADTF : loi sur l'aménagement durable du territoire forestier

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

PAFIO : plan d'aménagement forestier intégré opérationnel

PAFIT : plan d'aménagement forestier intégré tactique

PRAN : planification de la récolte annuelle

RADF : règlement sur l'aménagement durable des forêts du domaine de l'État

RATF : rapport d'activité technique et financier

UA : unité d'aménagement

UTA : unité territoriale d'analyse

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Introduction

En vertu de la Loi sur l'aménagement durable du territoire forestier (L.R.Q., c. A-18.1, article 40)¹, le ministre peut imposer aux personnes ou aux organismes soumis à un plan d'aménagement des normes d'aménagement forestier différentes de celles édictées par voie réglementaire. C'est entre autres le cas lorsqu'il apparaît que ces dernières ne permettent pas de protéger adéquatement l'ensemble des ressources d'un territoire. Le ministre peut également autoriser une dérogation aux normes réglementaires lorsqu'il lui est démontré que les modalités de substitution proposées par des personnes ou des organismes assureront une protection équivalente ou supérieure des ressources et du milieu forestiers.

Ainsi, en vertu de l'article 40² de la LADTF, les éléments suivants seront décrits dans le présent document :

- Les mesures de substitution proposées aux normes d'aménagement forestier édictées par voie réglementaire;
- Le territoire d'application de l'approche de substitution;
- Les normes réglementaires faisant l'objet de substitution;
- La démonstration de la protection équivalente ou supérieure des ressources et du milieu forestiers;
- Les mécanismes de suivi prévus pour assurer l'application de l'approche de substitution;
- Les amendes prévues en cas d'infraction.

Il est à noter que, pour toute disparité de lecture ou de compréhension entre le présent document et le texte légal, ce sont les documents officiels sur Légis Québec³ qui constituent les références.

¹ Consulter la Loi sur l'aménagement durable du territoire forestier à <http://legisquebec.gouv.qc.ca/fr/pdf/cs/A-18.1.pdf>.

² Consulter l'article 40 de la LADTF à <https://www.legisquebec.gouv.qc.ca/fr/version/lc/a-18.1?code=se.40&historique=20220426#20220426>.

³ Consulter le Règlement sur l'aménagement durable des forêts du domaine de l'État à <https://www.legisquebec.gouv.qc.ca/fr/document/rc/A-18.1.%20r.%200.01>.

Dérogação aux dispositions particulières applicables aux domaines bioclimatiques de la sapinière pour certaines parties des UA 085-51, 086-52 et 087-51

La région du Nord-du-Québec se trouve en grande majorité dans le domaine bioclimatique de la pessière à mousse. Trois UA dans la région sont donc aménagées en suivant les orientations de l'organisation spatiale en pessière à mousses. Une petite partie des UA 085-51, 086-52 et 087-51 se trouve à la limite du domaine bioclimatique de la sapinière à bouleau blanc. Étant donné que les caractéristiques forestières du territoire sont typiques du domaine de la pessière à mousses, il est souhaitable d'y appliquer la même approche.

Afin de continuer l'aménagement de ces forêts de la façon la plus appropriée, il est nécessaire de déroger aux articles du Règlement sur l'aménagement durable des forêts du domaine de l'État (RADF) applicables aux domaines bioclimatiques de la sapinière. Les unités territoriales de référence (UTR) sont utilisées pour définir les dispositions particulières de répartition des interventions forestières et de la forêt résiduelle applicables suivant le domaine bioclimatique sur les forêts du domaine de l'État. Ces subdivisions seront ainsi utilisées pour justifier les mesures de substitution à la dérogation.

1 Mesures de substitution proposées

Les mesures de substitution proposées consistent à appliquer les dispositions particulières du RADF concernant l'organisation spatiale des coupes applicables au domaine bioclimatique de la pessière à mousses (articles 144, 145 et 146) dans les portions des UA localisées dans le domaine bioclimatique de la sapinière à bouleau blanc.

2 Territoire d'application de l'approche de substitution

L'approche de substitution va s'appliquer à certaines UTR des unités d'aménagement 085-51, 086-52 et 087-51 qui sont situées dans la région du Nord-du-Québec (figure 1). Les superficies touchées par la dérogation sont inscrites au tableau 1.

Figure 1. Carte des UA, des UTR et des domaines bioclimatiques

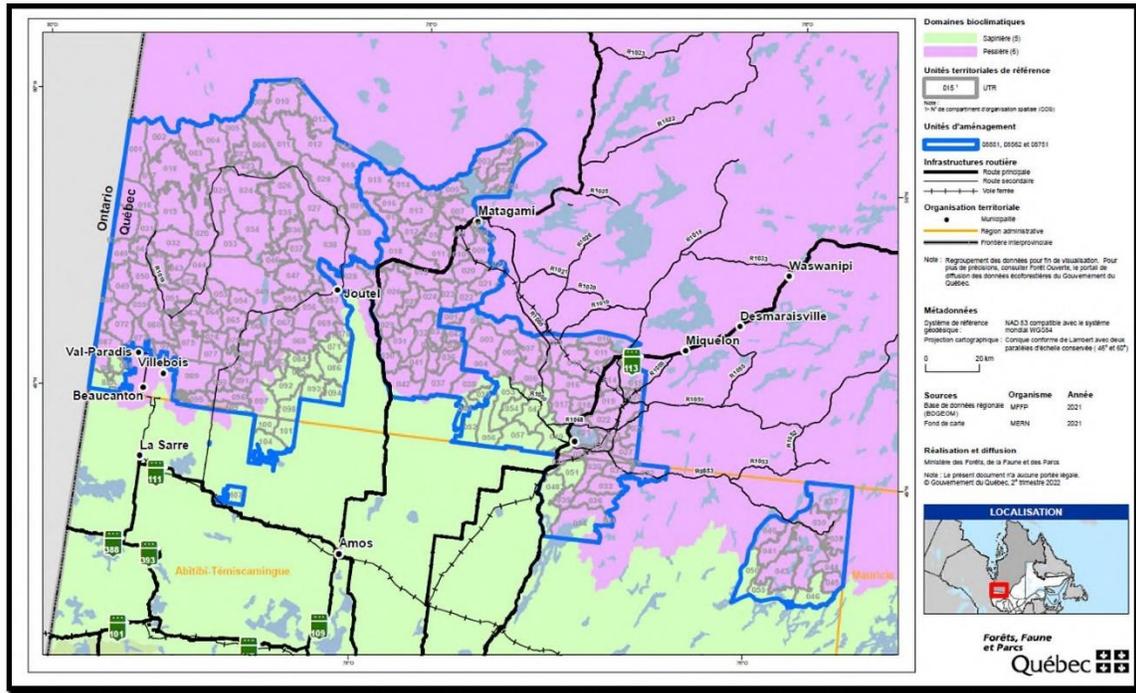


Tableau 1. Unités territoriales de référence dont la majorité de la superficie se trouve dans le domaine bioclimatique de la sapinière

| UA | NO UTR | Superficie forestière productive dans le domaine bioclimatique de la sapinière (ha) | Superficie forestière productive totale (ha) |
|--------------|---------------|---|--|
| 085-51 | 08551_COS070 | 2046,70 | 3405,40 |
| 085-51 | 08551_COS071 | 5159,20 | 5641,30 |
| 085-51 | 08551_COS084 | 3743,10 | 4073,60 |
| 085-51 | 08551_COS085 | 4702,80 | 4740,70 |
| 085-51 | 08551_COS086 | 10428,80 | 10428,80 |
| 085-51 | 08551_COS092 | 8399,80 | 8507,60 |
| 085-51 | 08551_COS093 | 5704,20 | 5704,20 |
| 085-51 | 08551_COS094 | 5199,80 | 5199,80 |
| 085-51 | 08551_COS097 | 5157,90 | 10455,60 |
| 085-51 | 08551_COS098 | 6290,70 | 6290,70 |
| 085-51 | 08551_COS100 | 4244,20 | 4244,20 |
| 085-51 | 08551_COS101 | 5914,40 | 5914,40 |
| 085-51 | 08551_COS103 | 29,90 | 29,90 |
| 085-51 | 08551_COS104 | 7787,00 | 7787,00 |
| 085-51 | 08551_COS106 | 422,10 | 422,10 |
| 085-51 | 08551_COS106a | 920,70 | 920,70 |
| 085-51 | 08551_COS107 | 3487,30 | 3487,30 |
| 085-51 | 08551_COS88A | 5889,80 | 6838,00 |
| 085-51 | 08551_COS88Aa | 366,20 | 366,20 |
| 086-52 | 08652_COS039 | 3677,40 | 3677,40 |
| 086-52 | 08652_COS040 | 2963,50 | 2963,50 |
| 087-51 | 08751_COS046 | 7219,60 | 7254,50 |
| 087-51 | 08751_COS047 | 12629,30 | 12648,00 |
| 087-51 | 08751_COS048 | 11300,70 | 11381,00 |
| 087-51 | 08751_COS049 | 11818,30 | 11877,50 |
| 087-51 | 08751_COS050 | 7888,90 | 7900,50 |
| 087-51 | 08751_COS051 | 6713,20 | 6734,40 |
| 087-51 | 08751_COS052 | 8129,80 | 8129,80 |
| 087-51 | 08751_COS053 | 11658,70 | 11671,20 |
| 087-51 | 08751_COS054 | 6673,80 | 6714,00 |
| 087-51 | 08751_COS055 | 5948,60 | 6042,20 |
| 087-51 | 08751_COS056 | 9203,30 | 9203,30 |
| 087-51 | 08751_COS057 | 11909,70 | 11909,70 |
| Total | | 203629,4 | 212564,5 |

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

Les normes réglementaires faisant l'objet de l'approche de substitution se trouvent à la section II du RADF, « Dispositions particulières applicables aux domaines bioclimatiques de l'érablière et de la sapinière », du chapitre VI, soit les articles 133 à 143. Le règlement est disponible en ligne⁴ et les articles concernés par la dérogation sont transcrits à l'annexe 1 de ce document.

4 Démonstration de la protection équivalente ou supérieure des ressources et du milieu forestiers

Une analyse de la dominance en essences des peuplements forestiers des UTR visées par la dérogation permet d'estimer si la composition de ces zones est typique du domaine de la sapinière ou de la pessière à mousses (tableau 2). Les peuplements forestiers dominés par le sapin baumier, l'essence représentative du domaine bioclimatique de la sapinière, ne couvrent en moyenne que 4 % des UTR faisant l'objet de la dérogation. Les peuplements dominés par l'épinette noire ou le pin gris, les essences représentatives du domaine bioclimatique de la pessière à mousses, quant à eux, couvrent en moyenne 49 % de l'ensemble de ces UTR. D'ailleurs, on peut voir à la figure 2 que celles-ci se trouvent dans une unité homogène propre à la pessière (ROEm).

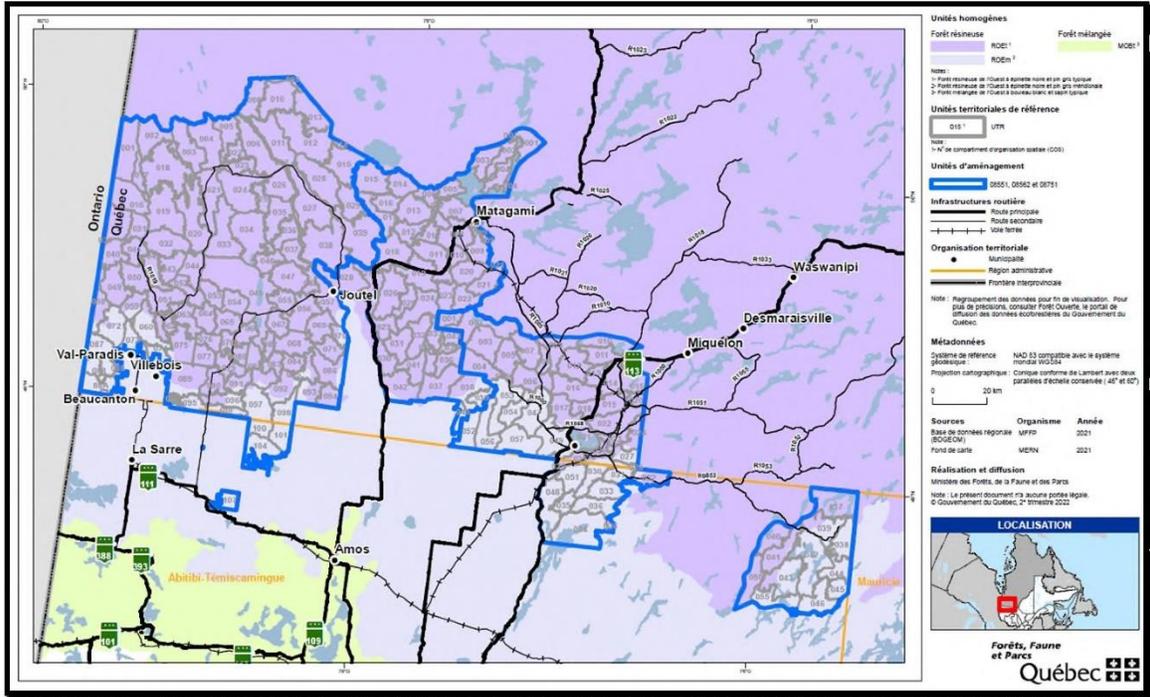
Ainsi, on peut conclure que, pour les territoires où l'approche de substitution est proposée, l'approche d'organisation spatiale des forêts la plus adaptée serait celle propre à la pessière à mousses.

⁴ Consulter le RADF à <https://mffp.gouv.qc.ca/RADF/guide/>.

Tableau 2. Répartition de la dominance en essences des peuplements forestiers par UTR (excluant les types sans couvert)

| NO UTR | Épinette noire (%) | Pin gris (%) | Sapin baumier (%) | Autres résineux (%) | Feuillus intolérants (%) |
|------------------------|--------------------|--------------|-------------------|---------------------|--------------------------|
| 08551_COS070 | 15% | 20% | 0% | 7% | 59% |
| 08551_COS071 | 25% | 26% | 0% | 9% | 41% |
| 08551_COS084 | 11% | 51% | 0% | 6% | 32% |
| 08551_COS085 | 31% | 12% | 2% | 13% | 42% |
| 08551_COS086 | 21% | 25% | 1% | 8% | 44% |
| 08551_COS092 | 37% | 19% | 1% | 21% | 23% |
| 08551_COS093 | 51% | 10% | 0% | 10% | 29% |
| 08551_COS094 | 51% | 30% | 1% | 3% | 15% |
| 08551_COS097 | 45% | 23% | 1% | 16% | 14% |
| 08551_COS098 | 49% | 14% | 0% | 20% | 17% |
| 08551_COS100 | 50% | 4% | 3% | 29% | 13% |
| 08551_COS101 | 55% | 12% | 3% | 6% | 23% |
| 08551_COS103 | 100% | 0% | 0% | 0% | 0% |
| 08551_COS104 | 67% | 1% | 3% | 5% | 24% |
| 08551_COS106 | 71% | 11% | 3% | 1% | 14% |
| 08551_COS106a | 57% | 19% | 5% | 3% | 16% |
| 08551_COS107 | 62% | 13% | 4% | 13% | 7% |
| 08551_COS88A | 61% | 14% | 1% | 3% | 22% |
| 08551_COS88Aa | 38% | 21% | 28% | 5% | 9% |
| 08652_COS039 | 67% | 25% | 0% | 2% | 6% |
| 08652_COS040 | 64% | 8% | 0% | 8% | 20% |
| 08751_COS046 | 62% | 18% | 1% | 1% | 18% |
| 08751_COS047 | 36% | 9% | 7% | 7% | 41% |
| 08751_COS048 | 64% | 1% | 15% | 7% | 12% |
| 08751_COS049 | 35% | 9% | 7% | 10% | 39% |
| 08751_COS050 | 41% | 1% | 3% | 33% | 22% |
| 08751_COS051 | 56% | 5% | 12% | 12% | 16% |
| 08751_COS052 | 60% | 7% | 4% | 6% | 23% |
| 08751_COS053 | 52% | 6% | 2% | 9% | 30% |
| 08751_COS054 | 40% | 8% | 3% | 6% | 43% |
| 08751_COS055 | 49% | 20% | 2% | 19% | 10% |
| 08751_COS056 | 51% | 17% | 2% | 11% | 18% |
| 08751_COS057 | 43% | 13% | 1% | 19% | 24% |
| Moyenne globale | 49% | 14% | 4% | 10% | 23% |

Figure 2. Carte des UA, des UTR et des unités homogènes de végétation



Dérogation pour le remplacement des cibles à l'échelle des unités territoriales de référence par des cibles à l'échelle des unités territoriales d'analyse et des compartiments d'organisation spatiale

Les unités territoriales de référence (UTR) ont été intégrées au Règlement sur les normes d'intervention dans les forêts du domaine de l'État (RNI) en 1996 et maintenues au Règlement sur l'aménagement durable des forêts du domaine de l'État (RADF). Elles étaient utilisées comme subdivisions du territoire forestier pour s'assurer du maintien du couvert forestier servant d'abri pour la faune et de la répartition des aires de coupe dans l'espace et le temps à l'échelle des unités d'aménagement.

Or, avec la mise en œuvre de l'aménagement écosystémique, de nouvelles cibles écologiques ont été établies à différentes échelles spatiales, c'est-à-dire à l'échelle des unités territoriales d'analyse (UTA) et des compartiments d'organisation spatiale (COS). La taille des UTA est équivalente ou supérieure à celle des UTR, alors que la taille des COS est inférieure. Les cibles d'aménagement écosystémique à ces différentes échelles spatiales sont équivalentes ou plus ambitieuses que la cible à l'échelle des UTR.

Ainsi, actuellement, en vertu du RADF et des orientations d'aménagement pour l'intégration des enjeux écologiques à la planification forestière, l'atteinte des cibles doit être démontrée à toutes ces échelles d'analyse. Il y a donc une superposition des entités (UTR, UTA, COS) qui amène une complexité à la planification sans offrir une protection supplémentaire.

1 Mesures de substitution proposées

Il est proposé de modifier l'article 16 en remplaçant la référence aux UTR par les UTA et d'abroger les articles 131 et 132.

Articles du RADF modifiés par la dérogation

16. Un minimum de 30 % de la superficie forestière productive constituée de peuplements de 7 m ou plus de hauteur doit, en tout temps, être conservé dans une pourvoirie avec droits exclusifs, une zone d'exploitation contrôlée ou une réserve faunique.

De plus, un minimum de 30 % de la superficie forestière productive constituée de peuplements de 7 m ou plus de hauteur doit être conservé dans les territoires ou parties de territoire suivants :

- 1. dans chaque unité territoriale de référence d'analyse ou portion d'unité d'au moins 30 km² comprise dans une pourvoirie avec droits exclusifs, une zone d'exploitation contrôlée ou une réserve faunique et située dans les domaines bioclimatiques de l'érablière ou de la sapinière;*
- 2. dans chaque agglomération de coupes ou portion d'agglomération d'au moins 30 km² comprise dans une pourvoirie avec droits exclusifs, une zone d'exploitation contrôlée ou une réserve faunique et située dans le domaine bioclimatique de la pessière à mousses.*

~~131. Un minimum de 30 % de la superficie forestière productive en forêt résiduelle de 7 m ou plus de hauteur doit être maintenu en tout temps dans une unité territoriale de référence où la récolte d'arbres est réalisée.~~

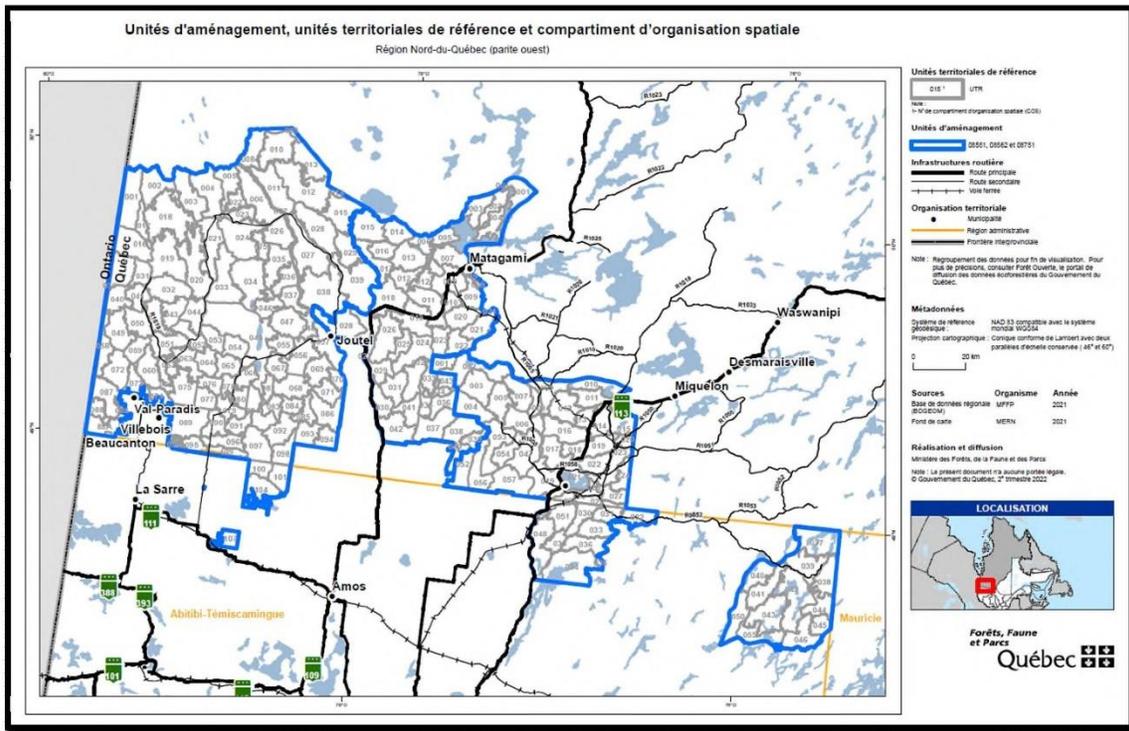
~~Lorsque les limites d'une unité territoriale de référence sont modifiées, notamment à la suite d'une modification des limites d'une unité d'aménagement, les dispositions du premier alinéa s'appliquent à la nouvelle unité territoriale de référence.~~

~~132. Les dispositions de l'article 131 n'empêchent pas le déboisement effectué dans le but de construire, d'améliorer ou de refaire un chemin donnant accès à une autre unité territoriale de référence.~~

2 Territoire d'application de l'approche de substitution

Le remplacement des cibles à l'échelle des UTR s'applique aux unités d'aménagement ou subdivisions de ce territoire situées dans les domaines bioclimatiques de la sapinière et de la pessière à mousses et où une approche visant le maintien de 30 % de forêt de 7 m ou plus par COS est appliquée. Plus précisément, il s'agit du territoire des UA 085-51, 086-52 et 087-51 (figure 3)

Figure 3. Carte des UA avec le contour des UTR et carte avec le contour des COS



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

Il s'agit des articles mentionnant les UTR, soit les articles 16, 131 et 132 du RADF (annexe 1).

4 Démonstration de la protection équivalente ou supérieure des ressources et du milieu forestiers

L'aménagement écosystémique vise à assurer le maintien de la biodiversité et la viabilité des écosystèmes en diminuant les écarts entre la forêt aménagée et la forêt naturelle (L.R.Q. c. A-18.1, article 4). Les entités spatiales de l'UTA et du COS s'inspirent de la dynamique de perturbations (nature, taille, fréquence) typiques de chaque domaine bioclimatique pour assurer une gestion complémentaire des ressources forestières à l'échelle de la perturbation et du paysage. L'échelle de l'UTR, qui se situe entre celle des UTA et celle des COS (tableau 3) et qui repose davantage sur un découpage administratif, devient par conséquent désuète.

Les orientations de l'aménagement écosystémique relatives à l'organisation spatiale sont encadrées par les cahiers conçus pour les domaines bioclimatiques de la pessière (cahier 3.1.1) et de la sapinière (cahier 3.2.1). Leur mise en œuvre est présentée dans le document « Analyse des enjeux » du PAFIT et s'accompagne d'une dérogation à la coupe en mosaïque et à la coupe totale autre que la coupe en mosaïque pour les domaines de la sapinière.

Tableau 3. Échelles spatiales et superficies associées selon les domaines bioclimatiques

| Domaine bioclimatique | COS | UTR | UTA |
|---------------------------|--|--------------------------|----------------------------|
| Sapinière à bouleau blanc | En moyenne 20 km ² | 300 km ² max. | 1 000 km ² max. |
| Pessière | De 30 à 150 ^a km ² | 500 km ² max. | 2 500 km ² max. |

^aÀ l'intérieur des zones où des modalités d'aménagement particulières sont appliquées pour la protection du caribou forestier, certains COS peuvent avoir des tailles supérieures à 150 km².

Les sections suivantes fournissent la démonstration que les modalités imposées offrent une protection équivalente ou supérieure aux normes réglementaires faisant l'objet de la substitution.

4.1 Protection équivalente à l'échelle de l'UTR

Dans toutes les UA où les orientations d'organisation spatiale sont appliquées, il faut maintenir en tout temps 30 % de forêt de 7 m ou plus dans chaque COS. Puisqu'une UTR contient plusieurs COS et que chacun d'eux doit posséder au moins 30 % de forêt de 7 m ou plus, la protection proposée est donc au moins équivalente à celle de l'article 131 pour assurer un maintien de forêts à couvert fermé qui seront mieux réparties dans l'espace. Les COS comportant moins de 30 % de leur superficie productive en forêt de 7 m ou plus sont fermés à la récolte.

Tableau 4. Indicateurs et cibles d'aménagement à imposer à l'échelle du COS

| Échelle spatiale | Entité spatiale | Indicateur | Cible |
|---------------------------|-----------------|---|--------|
| Perturbation par la coupe | COS | Proportion de la superficie forestière productive du COS en peuplements de 7 m ou plus de hauteur | ≥ 30 % |

4.2 Protection supérieure ou équivalente à l'échelle de l'UA

Dans le domaine bioclimatique de la pessière, l'article 144 du RADF fixe l'approche d'aménagement par l'implantation de massifs et d'agglomérations de coupes dans l'unité d'aménagement. Pour ce faire, l'unité d'aménagement est découpée en COS qui servent à définir les agglomérations de coupes et les massifs dans le temps et l'espace et dans lesquels la proportion minimale de forêts de 7 m ou plus à maintenir est évaluée. Le maintien de COS en massif forestier comprenant 70 % de forêts à couvert fermé sur 20 % de l'UA vient offrir une protection supplémentaire.

Extrait du RADF

2. « agglomération de coupes » : un territoire situé dans une unité d'aménagement dans lequel sont concentrées des aires de coupe totale accompagnées ou non de zones de perturbations naturelles récentes. Les agglomérations de coupes doivent être de forme variable et avoir une superficie inférieure ou égale à 150 km². Elles peuvent cependant atteindre une superficie plus grande dans le cas des plans visant la protection du caribou des bois, écotype forestier;

« **massif forestier** » : une aire forestière d'une superficie d'au moins 30 km² d'un seul tenant dont un minimum de 70 % de la superficie forestière productive est constitué de peuplements forestiers de 7m ou plus de hauteur.

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

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

Le portrait de la superficie de l'UA en forêt de 7 m ou plus de hauteur si les cibles minimales pour les COS (agglomération de coupes et massif forestier) sont appliquées démontre que la protection de l'UA est équivalente ou supérieure dans le domaine bioclimatique de la pessière (tableau 5).

Tableau 5. Portrait de l'UA en forêt de 7 m ou plus de hauteur avec l'application des cibles minimales par le découpage en UTR ou en COS

| Unité d'aménagement | Entité spatiale | Cible à l'échelle de l'UA | Superficie incluse* (ha) | Superficie incluse de 7 m ou plus minimale (ha) | 7 m ou plus minimum sur la superficie incluse (%) |
|---------------------|-----------------|------------------------------------|--------------------------|---|---|
| 085-51 | COS | 35 % de la superficie productive** | 942 702 | 320 707 | 34% |
| | UTR | 30 % de la superficie incluse | 941 420 | 282 426 | 30% |
| 086-52 | COS | 35 % de la superficie productive** | 354 435 | 128 554 | 36% |
| | UTR | 30 % de la superficie incluse | 352 590 | 105 777 | 30% |
| 087-51 | COS | 35 % de la superficie productive** | 441 420 | 133 662 | 30% |
| | UTR | 30 % de la superficie incluse | 440 028 | 132 008 | 30% |

* La superficie est calculée sur une base commune en retranchant les superficies exclues de l'aménagement (ex. : refuge biologique). Les superficies exclues de l'aménagement sont utilisées pour le calcul des cibles d'aménagement écosystémique. Pour le portrait, ces superficies sont fixées comme étant obligatoirement en forêt de 7 m ou plus. Par exemple, un COS couvert à 5 % par un refuge biologique aura une cible minimale de 25 % de forêt de 7 m ou plus au lieu de 30 % et sa superficie sera comptabilisée ainsi dans la superficie de l'UA.

** 80 % de la superficie productive de l'UA avec un minimum de 30 % en 7 m ou plus (agglomération de coupe) et 20 % de la superficie productive de l'UA avec un minimum de 70 % de 7 m ou plus (massifs forestiers).

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

Des suivis des cibles d'aménagement visées par l'approche de substitution seront effectués au moment de l'élaboration du plan d'aménagement forestier intégré tactique (PAFIT) et des plans d'aménagement forestier intégrés opérationnels (PAFIO). Pour effectuer ces suivis, les aménagistes devront dresser les listes des exigences minimales prévues à cette fin. Ces listes des exigences minimales permettront d'assurer le respect des cibles d'aménagement tactiques et opérationnelles.

Finalement, pour chacun des COS où la récolte est prévue durant la période de dérogation, des suivis seront également effectués au moment de l'élaboration de la programmation annuelle des activités de récolte (PRAN) et de l'analyse du rapport d'activité technique et financier (RATF) afin de s'assurer de nouveau du respect des cibles d'aménagement tactiques et opérationnelles.

Amendes prévues en cas d'infraction

Quiconque contrevient à l'une des modalités de substitution prévues dans la présente dérogation aux articles du RADF commet une infraction et est passible de l'amende prévue au paragraphe 3 de l'article 246 de la LADTF¹ (chapitre A-18.1) qui est de 2 000 \$ à 10 000 \$ par hectare ou partie d'hectare qui fait l'objet de l'infraction.

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

Annexe 1 Articles du RADF visés par la demande de dérogation

16. Un minimum de 30 % de la superficie forestière productive constituée de peuplements de 7 m ou plus de hauteur doit, en tout temps, être conservé dans une pourvoirie avec droits exclusifs, une zone d'exploitation contrôlée ou une réserve faunique.

De plus, un minimum de 30 % de la superficie forestière productive constituée de peuplements de 7 m ou plus de hauteur doit être conservé dans les territoires ou parties de territoire suivants :

1. dans chaque unité territoriale de référence ou portion d'unité d'au moins 30 km² comprise dans une pourvoirie avec droits exclusifs, une zone d'exploitation contrôlée ou une réserve faunique et située dans les domaines bioclimatiques de l'érablière ou de la sapinière;
2. dans chaque agglomération de coupes ou portion d'agglomération d'au moins 30 km² comprise dans une pourvoirie avec droits exclusifs, une zone d'exploitation contrôlée ou une réserve faunique et située dans le domaine bioclimatique de la pessière à mousses.

131. Un minimum de 30 % de la superficie forestière productive en forêt résiduelle de 7 m ou plus de hauteur doit être maintenu en tout temps dans une unité territoriale de référence où la récolte d'arbres est réalisée.

Lorsque les limites d'une unité territoriale de référence sont modifiées, notamment à la suite d'une modification des limites d'une unité d'aménagement, les dispositions du premier alinéa s'appliquent à la nouvelle unité territoriale de référence.

132. Les dispositions de l'article 131 n'empêchent pas le déboisement effectué dans le but de construire, d'améliorer ou de refaire un chemin donnant accès à une autre unité territoriale de référence.

133. Dans les unités d'aménagement ou dans les unités territoriales de référence situées dans les domaines bioclimatiques de l'érablière visés à l'annexe 1, les aires de coupe totale doivent :

3. avoir une dimension inférieure ou égale à 25 ha sur au moins 70 % de la superficie récoltée selon ce type de coupe;
4. avoir une dimension inférieure ou égale à 50 ha sur au moins 90 % de la superficie récoltée selon ce type de coupe;
5. avoir une dimension inférieure ou égale à 100 ha sur 100 % de la superficie récoltée selon ce type de coupe.

134. Dans les unités d'aménagement ou dans les unités territoriales de référence situées dans les domaines bioclimatiques de la sapinière visés à l'annexe 1, les aires de coupe totale doivent :

1. avoir une dimension inférieure ou égale à 50 ha sur au moins 70 % de la superficie récoltée selon ce type de coupe;
2. avoir une dimension inférieure ou égale à 100 ha sur au moins 90 % de la superficie récoltée selon ce type de coupe;
3. avoir une dimension inférieure ou égale à 150 ha sur 100 % de la superficie récoltée selon ce type de coupe.

135. Les aires de coupe totale auxquelles s'appliquent les articles 133 et 134 sont celles indiquées dans le plan d'aménagement forestier intégré et dont la récolte prévue s'effectue au cours d'une année de récolte.

136. Une lisière boisée d'un seul tenant doit être conservée entre les aires de coupe totale autre que la coupe en mosaïque, jusqu'à ce que la régénération des aires de coupe ait atteint une hauteur moyenne de 3 m. La lisière boisée entre 2 aires de coupe doit être d'une largeur d'au moins 60 m lorsque chaque aire de coupe couvre une superficie inférieure à 100 ha ou d'une largeur minimale de 100 m lorsque l'une de ces deux aires de coupe couvre une superficie de 100 à 150 ha.

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

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

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

La coupe partielle est permise sur 25 % de la longueur totale des lisières boisées visées à l'article 136 comprises dans une unité d'aménagement ou dans un autre territoire forestier du domaine de l'État. Cependant, la lisière boisée faisant l'objet d'une coupe partielle entre 2 aires de coupe totale doit être d'une largeur d'au moins 75 m lorsque chaque aire de coupe couvre une superficie inférieure à 100 ha ou d'une largeur minimale de 125 m lorsque l'une de ces 2 aires de coupe couvre une superficie de 100 à 150 ha.

Après la coupe partielle, la lisière boisée, qui doit servir d'écran visuel et de corridor pour le déplacement de la faune, doit être composée, par hectare, d'au moins 1 500 tiges vivantes d'essences commerciales debout d'un diamètre de 2 cm et plus mesuré à une hauteur de 1,3 m à partir du plus haut niveau du sol.

Pour réaliser la coupe partielle visée au deuxième alinéa, le déboisement des sentiers d'abattage ou de débardage doit être effectué sur une largeur inférieure à 1,5 fois celle de l'engin forestier utilisé.

Toutefois, la construction ou l'amélioration d'un chemin qui traverse la lisière boisée est permise dans la mesure où le déboisement effectué à cette fin n'excède pas la largeur de l'emprise prévue à l'annexe 4 pour la classe de chemin à laquelle il appartient.

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

139. La forêt résiduelle d'une coupe en mosaïque doit posséder les caractéristiques suivantes :

1. avoir, à l'intérieur de la limite du chantier de récolte en mosaïque, une superficie au moins équivalente à celle des aires de coupe d'une coupe en mosaïque;
2. avoir une largeur d'au moins 200 m;
3. être constituée de peuplements forestiers de 7 m ou plus de hauteur sur au moins 80 % de sa superficie et de peuplements forestiers d'au moins 4 m sur sa superficie restante;
4. être constituée de peuplements ayant une densité du couvert forestier supérieure à 40 % sur au moins 80 % de sa superficie et de 25 à 40 % sur sa superficie restante. Elle peut aussi être constituée de peuplements ayant une densité du couvert forestier de 25 à 40 % sur plus de 20 % de sa superficie, pourvu que cette proportion soit égale ou inférieure à celle des peuplements présentant une telle densité et qui sont situés dans les forêts de 7 m ou plus de hauteur du chantier de récolte en mosaïque avant intervention;
5. être constituée de peuplements forestiers qui sont en mesure de produire en essences commerciales un volume de bois marchand brut à maturité d'au moins 50 m³/ha ou, lorsqu'ils ne sont pas en mesure de produire un tel volume, être constituée de peuplements forestiers équivalents en composition et en superficie à ceux récoltés;
6. être constituée de peuplements forestiers appartenant dans une proportion d'au moins 20 % au même type de couvert forestier que ceux récoltés;
7. ne pas avoir fait l'objet, au cours des 10 dernières années de récolte, d'une récolte commerciale autre qu'un traitement sylvicole visé au deuxième alinéa de l'article 142.

140. Chaque chantier de récolte en mosaïque doit être indiqué au plan d'aménagement forestier intégré. Il en est de même de la forêt résiduelle d'une coupe en mosaïque. Une fois indiquée au plan, la forêt résiduelle d'une coupe en mosaïque ne peut servir de nouveau de forêt résiduelle tant que la récolte ne peut s'y effectuer conformément aux dispositions du premier alinéa de l'article 142.

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

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

Une superficie forestière composée d'arbres, d'arbustes ou de broussailles d'une hauteur moyenne de 3 m ou plus d'une largeur d'au moins 200 m doit également être conservée entre une forêt résiduelle et les aires de coupe d'une

coupe en mosaïque de même qu'entre une forêt résiduelle et les autres aires de coupe totale, afin de servir de corridor pour le déplacement de la faune.

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

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

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

1. une éclaircie commerciale ou une coupe de jardinage effectuée selon les prescriptions sylvicoles applicables;
2. une coupe partielle, dans un peuplement d'arbres ayant atteint son âge de maturité ou qui l'atteindra dans moins de 15 ans, où l'on récolte au plus 35 % de la surface terrière marchande du peuplement à la condition cependant de maintenir, après récolte, une surface terrière marchande d'au moins 15 m²/ha d'arbres bien espacés, et ce, en essences et en proportion semblables à celles du peuplement initial.

Une forêt résiduelle d'une coupe en mosaïque peut être traversée par un chemin dont la largeur de déboisement n'excède pas la largeur de l'emprise prévue à l'annexe 4 pour la classe de chemin à laquelle il appartient ou encore par un cours d'eau dont la largeur aux limites de l'écotone riverain n'excède pas en moyenne 35 m. Toutefois, au moment d'indiquer une forêt résiduelle au plan d'aménagement forestier intégré, ni la superficie ni la largeur du chemin ou du cours d'eau ne peuvent être considérées dans le calcul de la superficie et de la largeur de la forêt résiduelle pour les fins de l'application des paragraphes 1 et 2 de l'article 139.

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

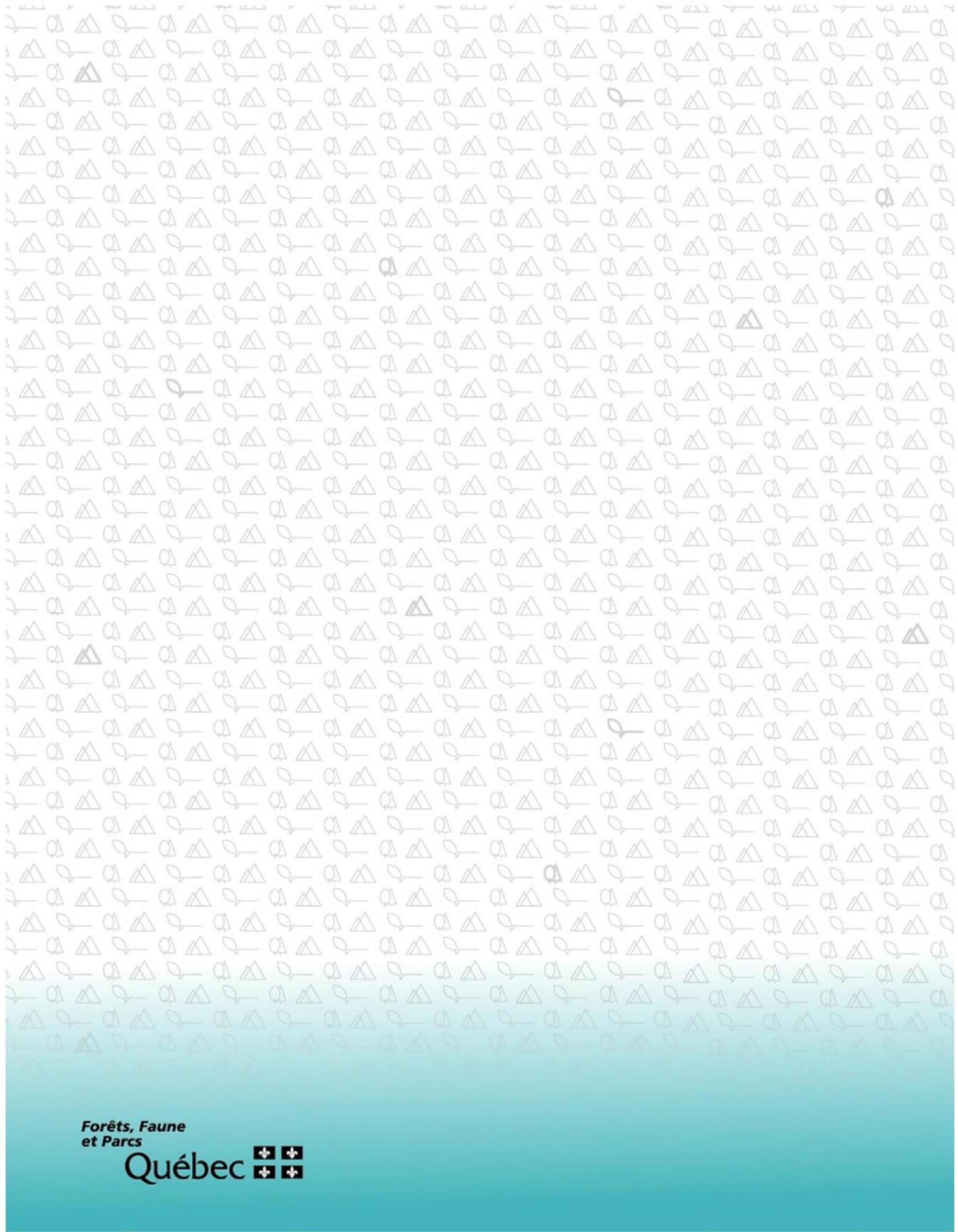
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**Forêts, Faune
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Québec 

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



Objective number : 1.01.1

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

Management unit(s) : 087-51

Criteria : Biological diversity

Issue (value) : Changes in forest composition

Issue clarification : The term “forest composition” refers to the variety and proportion of tree species in a forest. Composition plays a major role in ecosystem functions, at both landscape and stand level. The type of vegetation affects the availability of resources, food and habitats for wildlife, as well as internal stand temperatures, the nutrient cycle and natural disturbances. Consequently, silvicultural practices that alter forest composition can affect certain species and certain ecological processes in the forest, and are therefore likely to have repercussions for biodiversity maintenance and ecosystem viability.

Objective : Halt hardwood encroachment to ensure that the composition of managed forests is similar to that of natural forests.
Hardwood encroachment in a softwood or mixedwood stand occurs after a severe disturbance (fire, logging), especially when hardwood species are established before the disturbance. Some ecological types are more susceptible to hardwood encroachment than others. Targeted silvicultural actions can help maintain a species composition similar to that found in the natural forest. Control of hardwood encroachment can help maintain mixedwood stands that might otherwise be converted into hardwood stands.

Connection with other objectives : Hardwood encroachment can be halted while maintaining the habitats associated with young mixedwood and hardwood stands. The objective for the internal structure of young stands (1.04.1) is to divide forestry work over time and space, to ensure that sufficient habitats are maintained at all times.

Chosen strategy and expected effects

1. Scarification with double pass harrowing

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

2. Reforestation (planting or fill planting)

Reforestation and fill planting help restore production to sites containing few desired species or sites with limited productivity.

Reforestation and fill planting promote full afforestation and help maintain productivity in the management unit's forests.

Combined with tending of young stands, they also help to maintain a composition of desired species (e.g. by countering hardwood encroachment).

3. Clearing and cleaning

Clearing or cleaning of stands of softwood or mixed origin that are susceptible to hardwood encroachment.

Clearing and cleaning should help to preserve the softwood or mixed composition of the stand and hence counter encroachment.

4. Irregular shelterwood cut

Irregular shelterwood cutting will be planned over an area equal to at least 5% of the planned regeneration cutting area throughout the integration zone. The ultimate target per management unit is established in hectares.

Irregular shelterwood cuts that remove 40% or less are those that are best suited to achieving the objective of maintaining or developing old-growth forest and habitat attributes. Partial cuts with harvest rates that are not too high will preserve the principal characteristics of the habitats, which will therefore continue to be used by the American marten, for example. Irregular shelterwood cuts with permanent tree cover are an example of this type of cut.

Regardless of whether the aim is to maintain the cover type or transition to a softwood-dominated stand, irregular shelterwood cutting is a relevant approach, especially in potential vegetation where tending of regenerating stands would require costly treatments. To maintain white spruce, stands with white spruce components could be given priority in scenarios involving partial cuts such as irregular shelterwood cuts.

The use of irregular shelterwood cutting should help to:

- Reduce hardwood encroachment
- Maintain old-growth stands with irregular structures
- Foster the development of the white spruce component in stands where white spruce is present
- Better maintain old-growth forest structures and reduce the quantity of regenerating stands
- Promote the maintenance of habitats associated with mature forests

Significant activities for the implementation of the strategy:

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

Indicator number: 1.01.1.B **Indicator type:** Performance indicator

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

Scale: Management unit

Indicator clarifications: Silvicultural actions limiting hardwood expansion are:
- Clearing, pre-commercial thinning and cleaning
- Irregular shelterwood cutting
- Preventive scarification
The sites to be considered in the indicator are softwood or mixed stands (at the time of logging) that may be invaded by hardwood species as a result of breaching the canopy. The sites that are most susceptible to hardwood encroachment are potential vegetations ME1, MS2 and, to a lesser extent, RS2. Site visits will confirm whether or not the risk of hardwood encroachment is real.

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

Frequency: Five-yearly

Breakdown by: Year

Target 60%

Deviation: None.

Target and results for each MU

| MU 087-51 | Target 60% | Deviation | 0 % |
|------------------|------------|------------|-----|
| Reference period | Value | Evaluation | |
| Review 2013-2018 | 62,4 % | Green | |
| | 98,2 % | Green | |
| | 112,3 % | Green | |
| | 104,3 % | Green | |
| | 79,9 % | Green | |
| | 95,6 % | Green | |

Information on target: It is important to identify the sites at risk of hardwood encroachment in order to apply the treatments in the right places. When a risk is confirmed, the action target to limit hardwood encroachment is 100%.
Maintenance of mixedwood stand characteristics also helps to halt hardwood encroachment because it preserves the softwood component of the stand.
Ultimately, the areas treated by means of release, cleaning or pre-commercial thinning will also be treated according to the relevance of carrying out this work on the site in question.

Timeframe: None.

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

Indicator monitoring program:

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

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

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle

Date : 2022-05-11



Objective number : 1.01.3

Name of objective : Maintaining or increasing white spruce abundance

Management unit(s) : 087-51

Criteria : Biological diversity

Issue (value) : Changes in forest composition

Issue clarification : The term “forest composition” refers to the variety and proportion of tree species in a forest. Composition plays a major role in ecosystem functions, at both landscape and stand level. The type of vegetation affects the availability of resources, food and habitats for wildlife, as well as internal stand temperatures, the nutrient cycle and natural disturbances. Consequently, silvicultural practices that alter forest composition can affect certain species and certain ecological processes in the forest, and are therefore likely to have repercussions for biodiversity maintenance and ecosystem viability.

Objective : Maintain or increase the white spruce component in managed forests. The white spruce is a companion species in many stands in Northern Québec. The short forest rotation, combined with winter logging and CPRS without retention of biological legacy are not conducive to natural regeneration of the species. The lack of post-logging germination beds appears to be the main cause of its decline, which is especially visible in the fir and fir-spruce forests. However, conditions are conducive to balsam fir regeneration, thereby amplifying the problem of white spruce regeneration. It is important to maintain white spruce in Northern Québec’s forests, even though the species is not abundant. Maintenance of a less usual species is a vital element in a biodiversity maintenance strategy.

Connection with other objectives : Variable retention cutting (objective 1.03.1) and partial cutting (objective 1.02.1) both encourage the maintenance and natural regeneration of white spruce when it is present in a stand.

Chosen strategy and expected effects

1. Reforestation or fill planting with white spruce

In the case of rich potential vegetation (MS2 and RS2 rich), or in sectors where the 4th ten-year inventory showed white spruce, fill planting or reforestation using white spruce may be an appropriate strategy.

Reforestation or fill planting with white spruce on favourable sites will help maintain the presence of white spruce in the management unit.

2. Irregular shelterwood cut

Irregular shelterwood cutting will be planned over an area equal to at least 5% of the planned regeneration cutting area throughout the integration zone. The ultimate target per management unit is established in hectares.

Irregular shelterwood cuts that remove 40% or less are those that are best suited to achieving the objective of maintaining or developing old-growth forest and habitat attributes. Partial cuts with harvest rates that are not too high will preserve the principal characteristics of the habitats, which will therefore continue to be used by the American marten, for example. Irregular shelterwood cuts with permanent tree cover are an example of this type of cut.

Regardless of whether the aim is to maintain the cover type or transition to a softwood-dominated stand, irregular shelterwood cutting is a relevant approach, especially in potential vegetation where tending of regenerating stands would require costly treatments. To maintain white spruce, stands with white spruce components could be given priority in scenarios involving partial cuts such as irregular shelterwood cuts.

The use of irregular shelterwood cutting should help to:

- Reduce hardwood encroachment
- Maintain old-growth stands with irregular structures
- Foster the development of the white spruce component in stands where white spruce is present
- Better maintain old-growth forest structures and reduce the quantity of regenerating stands
- Promote the maintenance of habitats associated with mature forests

3. CPRS with retention by clumps

CPRS with retention by clumps is a form of variable retention cutting in which residual merchantable trees are organized into small clumps evenly spread over the cutting area. Where necessary, it is followed by scarification, reforestation and/or clearing, but not in the clumps.

To encourage the maintenance of white spruce, CPRS with retention by clumps may be a good choice of variable retention cut in MS2 and RS2 rich potential vegetation or in sectors where most of the stands have a white spruce component. CPRS with retention by clumps is a good choice because it helps to maintain seed trees and high calibre stems that will provide germination sites in the medium term.

CPRS with retention by clumps would help to:

- Preserve merchantable trees and dead trees throughout the cutting area
- Provide an environment conducive to natural regeneration of white spruce when seed trees are present in the clump
- Maintain large trees in young, forming stands, thereby creating habitats for cavicolous species among others

Significant activities for the implementation of the strategy:

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

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle

Date : 2022-05-11



Objective number : 1.02.1

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

Management unit(s) : 087-51

Criteria : Biological diversity

Issue (value) : Irregular old-growth forest

Issue clarification : Natural stand dynamics in the boreal forest mean that internal stand structure changes over time. The longer the interval between severe disturbances, the greater the chance that the stand will develop a complex structure. Following clear-cutting, a single tree cohort is reconstituted and will form a regular-structured stand. In addition, given that forest rotations are shorter than natural disturbance cycles, stands do not have time to re-develop complex structures. The logging rate is therefore likely to result in a scarcity of stands with complex structures at landscape level. Old-growth stands with irregular structures account for a significant percentage (25% or more) of the natural forest in the Northern Québec region, and some of these stands have been affected by logging.

Objective : Ensure that the percentage of old-growth stands with complex internal structures in managed forests is similar to that in the natural forest. One of the main solutions to this issue is to carry out a larger percentage of partial cuts. An action target will therefore be established because the region does not have much expertise in partial cutting. This will be done based on the management unit's forestry potential for partial cutting, the regional teams' operation potential for this type of treatment and the minimum amount required to justify the acquisition of this type of expertise by the region.

Connection with other objectives : Stands treated with irregular shelterwood cuts rather than clear-cuts help achieve the age structure target.

Chosen strategy and expected effects

1. Irregular shelterwood cut

Irregular shelterwood cutting will be planned over an area equal to at least 5% of the planned regeneration cutting area throughout the integration zone. The ultimate target per management unit is established in hectares.

Irregular shelterwood cuts that remove 40% or less are those that are best suited to achieving the objective of maintaining or developing old-growth forest and habitat attributes. Partial cuts with harvest rates that are not too high will preserve the principal characteristics of the habitats, which will therefore continue to be used by the American marten, for example. Irregular shelterwood cuts with permanent tree cover are an example of this type of cut.

Regardless of whether the aim is to maintain the cover type or transition to a softwood-dominated stand, irregular shelterwood cutting is a relevant approach, especially in potential vegetation where tending of regenerating stands would require costly treatments. To maintain white spruce, stands with white spruce components could be given priority in scenarios involving partial cuts such as irregular shelterwood cuts.

The use of irregular shelterwood cutting should help to:

- Reduce hardwood encroachment
- Maintain old-growth stands with irregular structures
- Foster the development of the white spruce component in stands where white spruce is present
- Better maintain old-growth forest structures and reduce the quantity of regenerating stands
- Promote the maintenance of habitats associated with mature forests

2. Elongation of rotation in targeted stands

In operational planning, the choice of stands of conservation interest when selecting residual forest blocks can, for example, help elongate the rotation period. These stands of interest may be old-growth forests, mature mixed stands, irregular stands or other habitats of interest. Elongation of rotations in certain stands should help to:

- Maintain and create irregular structured old-growth stands while applying the principle of precaution
- Help maintain the structures of old-growth forests and reduce the over-abundance of regenerating stands, while reducing the impact on allocations
- Allow white spruce trees to acquire the maturity required for regeneration to become established before final cutting

3. Targeted degree of alteration by UTA

Every management unit is divided into territorial analysis units (UTAs). For each UTA, targets have been established for old-growth forests and the maximum quantity of regenerating forests. This is the targeted degree of alteration (low, moderate or high). These restrictions on forest age force rotations to become longer in UTAs with too many regenerating forests or not enough old-growth forests, compared to their targets.

This requirement helps to ensure that old-growth forests are distributed throughout the management unit. The application of a requirement at TAU level helps to foster the presence of old-growth forests throughout the management unit.

The management strategy, by preserving a percentage of old-growth forests and limiting the percentage of regenerating forests, reduces the risk of biodiversity loss at UTA level.

4. Protected area

Protected areas, biological refuges and exceptional forest ecosystems within an area help to protect old-growth forests and also limit logging.

Maintenance of areas unaffected by logging should help to:

- Improve the maintenance of old-growth forest structures
- Reduce the over-abundance of regenerating stands
- Protect high conservation value elements such as essential habitats

Significant activities for the implementation of the strategy:

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

Indicator number: 1.02.1.B **Indicator type:** Performance indicator

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

Scale: Management unit

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

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

Frequency: Five-yearly

Breakdown by: Year
Integration zone (groups of MU)

Target 5%

Deviation:

Target and results for each MU

| MU 087-51 | Target 5% | Deviation | 0 % |
|------------------|-----------|-----------|------------|
| Reference period | | Value | Evaluation |
| Review 2013-2018 | | 4,2 % | Yellow |
| | | 6,7 % | Green |
| | | 4,4 % | Yellow |
| | | 5,6 % | Green |
| | | 11,6 % | Green |
| | | 7,6 % | Green |

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

Timeframe: None.

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

Indicator monitoring program:

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

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle

Date : 2022-05-11



Objective number : 1.03.1

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

Management unit(s) : 087-51

Criteria : Biological diversity

Issue (value) : Biological legacies in clearcuts

Issue clarification : Deadwood accumulates in variable quantities in the natural forest, depending on stand age. In the Northern Québec region, significant quantities of deadwood accumulate after major disturbances such as fires. Mortality can occur up to ten years after a fire, thereby ensuring recruitment and a significant volume of deadwood shortly after the fire. As the stand ages, the deadwood decomposes and quantities decrease. The amount of debris and snags will start to increase during the canopy transition phase, i.e. with the onset of mortality of the first cohort established after the fire. If undisturbed, mature stands will become old-growth stands, with deadwood recruitment occurring as a result of the gaps in the canopy resulting from tree senescence.

Fallen deadwood and snags are key attributes for biodiversity maintenance. Many species depend on these attributes at one time or another in their life cycle. Researchers in Québec have identified 60 species of vertebrates (amphibians, reptiles, mammals and birds) that use deadwood. In addition to being used by wildlife, dead trees are also important for forest productivity: a large percentage of the organic matter restored to circulation in the ecosystem comes from these structures. They also serve as germination environments for numerous plant species, which take root in the wood and bark in order to extract water and nutrients.

In the managed forest, final cutting leaves very few merchantable trees in the logging area. This is a major difference from the natural forest. Scarcity of biological legacies has been identified as one of the main issues to be taken into account in the application of ecosystem-based management.

Objective : Ensure that biological legacies are sufficiently present in a significant part of the cutblocks. The aim is to reduce the difference between the quantity of biological legacies (large dead or living trees) in the managed and natural forests, and to maintain an even distribution of good quality biological legacies in sufficient quantities.

The quality of a biological legacy is assessed from the size of the remaining trees (the larger they are, the better it is), their stage of deterioration (living, recent dead, older dead) and species (trembling aspen is especially favourable, for example).

Connection with other objectives : Variable retention cuts help maintain white spruce (objective 1.01.3) when seed trees are present in the stand. Retention of biological legacies is also very important in maintaining species that are sensitive to forest management.

Chosen strategy and expected effects

1. 40 % of variable retention cutting

In order to preserve legacies and foster the maintenance of biological diversity, variable retention cutting that retains at least 5% of the stand's merchantable volume should be applied to at least 40% of the area harvested. Variable retention cuts should be spread throughout the management unit, and not grouped into a single sector. This means aiming for at least 20% of variable retention cuts in each planned spatial organization compartment (COS).

There should be a certain amount of diversity in the forms of retention practised in each COS. Within the 40% target, a balance should be achieved between the various forms of retention (small clusters, large blocks (1 to 5 ha), individual trees). Each form has

advantages and disadvantages for conservation of biodiversity and landscape aesthetics. Stand type and internal structure, type of environment and harmonization requirements will all influence the choice of treatment.

Variable retention cutting will help to:

- Maintain a certain volume of standing timber that will age
- Foster the creation of germination beds associated with deadwood
- Maintain biodiversity at disturbance (harvest) level. For example, large trees left standing in logging areas will provide perches for birds that hunt in open areas

2. CPRS with retention by clumps

CPRS with retention by clumps is a form of variable retention cutting in which residual merchantable trees are organized into small clumps evenly spread over the cutting area. Where necessary, it is followed by scarification, reforestation and/or clearing, but not in the clumps.

To encourage the maintenance of white spruce, CPRS with retention by clumps may be a good choice of variable retention cut in MS2 and RS2 rich potential vegetation or in sectors where most of the stands have a white spruce component. CPRS with retention by clumps is a good choice because it helps to maintain seed trees and high calibre stems that will provide germination sites in the medium term.

CPRS with retention by clumps would help to:

- Preserve merchantable trees and dead trees throughout the cutting area
- Provide an environment conducive to natural regeneration of white spruce when seed trees are present in the clump
- Maintain large trees in young, forming stands, thereby creating habitats for cavicolous species among others

3. CPRS with retention of large individual stems

CPRS with retention of large individual stems involves preserving individual trees with a breast height diameter of more than 20 cm throughout the cutting area. Cavicolous species prefer trembling aspen, and this species should also be favoured when selecting the trees to be retained in the field. Planned retention for stands is 30 stems per hectare. This type of cutting can be followed by clearing if necessary.

Maintaining large trees in the cutting area helps to:

- Preserve habitats for cavicolous species
- Ensure recruitment of large deadwood for the future stand

4. CPRS with patch retention

CPRS with patch retention involves protecting large clusters of trees covering areas of 1 to 5 hectares able to contain interior forest. These clusters or patches cover 5% of the harvestable area and are compact (fairly wide) in terms of shape. A patch can be left around an inaccessible area or small wetland. However, only the productive forest area in the patch counts towards the 5% retention target.

This type of retention is particularly favourable to the maintenance of moss and hepatica plants. These small species need humidity and shade, and can subsist within the cutting area thanks to the presence of the patches.

CPRS with patch retention helps to:

- Maintain forest clusters containing interior forest, thereby contributing to the survival, in cutting areas, of species associated with interior forests
- Preserve merchantable trees and dead trees at cutting sites

Significant activities for the implementation of the strategy:

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

Indicator number: 1.03.1.A **Indicator type:** Performance indicator

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

Scale: Landscape

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

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

Frequency: Five-yearly

Breakdown by: Year
Management unit

Target 40%

Deviation: None.

Target and results for each MU

| MU 087-51 | Target 40% | Deviation | 0 % |
|------------------|------------|------------|-----|
| Reference period | Value | Evaluation | |
| Review 2013-2018 | 40,8 % | Green | |
| | 34,9 % | Yellow | |
| | 0,8 % | Red | |
| | 33,8 % | Yellow | |
| | 65,0 % | Green | |
| | 49,2 % | Green | |

Information on target: The 40% target applies to the management unit as a whole. It is preferable to distribute variable retention cuts among all the traplines. Indicator 1.03.1.B is used to measure the distribution of variable retention cuts in each trapline.

Timeframe: None.

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

Indicator monitoring program:

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

Indicator number: 1.03.1.B **Indicator type:** Performance indicator

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

Scale: Landscape

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

Useful definitions:

Frequency: Five-yearly

Breakdown by: Year
Spatial organization compartment or trapline

Target 100% of the compartments

Deviation: None.

Target and results for each MU

| MU 087-51 | Target | Deviation | 0 % |
|------------------|--------------------------|-----------|------------|
| Reference period | | Value | Evaluation |
| Review 2013-2018 | 100% of the compartments | 66,7 % | Yellow |
| | | 66,7 % | Yellow |
| | | 50,0 % | Red |
| | | 66,7 % | Yellow |
| | | 100,0 % | Green |
| | | 100,0 % | Green |

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

Timeframe: None.

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

Indicator monitoring program:

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

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle

Date : 2022-05-11



Objective number : 1.04.1

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

Management unit(s) : 087-51

Criteria : Biological diversity

Issue (value) : Young forest structure and composition

Issue clarification : In the Northern Québec region, young stands between 10 and 25 years of age provide habitats with a sapling-rich habitat that is beneficial to small wildlife species such as the ruffed grouse and snowshoe hare. The lateral cover is ideal to provide food and protection from predators. Other species such as the moose and black bear also appreciate these young stands, as sources of food. Stand tending treatments such as pre-commercial thinning, stand cleaning and stand release, are appropriate to maintain the desired composition and control competing vegetation. Silvicultural actions such as these alter the structure and composition of the young stands that are treated. Alterations may include homogenization of tree density and spatial distribution of trees, simplification of the vertical structure, reduction of lateral cover, depletion of fruit trees and depletion of dense sapling stands. Stand tending treatments in this type of habitat change its characteristics and spoil it for up to five years. After that time, shelter cover and food are present in sufficient quantities to meet the needs of most of the species that use these environments. This issue requires particular attention in order to provide an adequate supply of young, dense, diversified stands.

Objective : Limit simplification of internal stand structure in young second-growth stands. The aim is to provide an adequate supply of young, dense, diversified stands. Forest managers therefore wish to avoid simplifying or standardizing the layers resulting from clearcutting over a given period, and to use mitigation measures in the areas most at risk.

Connection with other objectives : This objective helps to preserve young habitats for the snowshoe hare, moose and American marten (objective 1.07.1). It could be in opposition to the issue on the hardwood encroachment (1.01.1). To ensure the achievement of both objectives, mitigation measures must be promoted in educational work.

Chosen strategy and expected effects

1. Limit the percentage of stand tending treatments

Aim to have at least 50% of young stands between 10 and 25 years of age that have not undergone stand tending treatments for at least five years, in 6,000 hexagon units. Stand tending treatments such as pre-commercial thinning, clearing and cleaning reduce species density and diversity in young stands and hence diminish wildlife habitat quality for a period of up to five years.

By spreading stand tending treatments over time in young, dense habitats suitable for small wildlife, it is possible to ensure that sufficient quantities of these habitats are available at all times.

2. Adapted stand tending treatments

Adapted stand training treatments will be applied to some young stands, whether they are natural or produced by planting. These treatments will encourage the survival of fruit bushes and/or a range of commercial species.

In the Nord-du-Québec region, fruit bushes must be protected during all stand tending treatments. The requirement applies to the following plants: sorb, elderberry, juneberry, hazel, arrowwood and cherry. These plants must, as far as possible, be preserved throughout the treated area. In addition, a fruit bush that grows within the radius required by a measured tree will not penalize the tree.

The use of adapted treatments will help to maintain quality habitats for species associated with young, dense stands. Preservation of fruit bushes will also help to maintain interesting habitats for wildlife species associated with young stands.

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

Distribute stand tending treatments so as to foster continued use (especially small game hunting and trapping), depending on the stakeholders' needs.

By spreading this type of work out, an ongoing supply of quality habitats can be maintained for the harvested species.

Significant activities for the implementation of the strategy:

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

Indicator number: 1.04.1.A **Indicator type:** Performance indicator

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

Scale: Landscape

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

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

Frequency: Yearly

Breakdown by: 6,000 ha hexagons

Target 100%

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

Target and results for each MU

| MU 087-51 | Target | 100% | Deviation | 0 % |
|-------------------------|---------|------------|-----------|-----|
| Reference period | Value | Evaluation | | |
| Year of reference: 2013 | 100,0 % | Green | | |
| Year of reference: 2017 | 100,0 % | Green | | |
| | 99,0 % | Yellow | | |
| | 99,0 % | Yellow | | |

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

Timeframe: None.

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

Indicator monitoring program:

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

the reference year and compare the result to that for stands 10 to 25 years of age in a given reference year.

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle

Date : 2022-05-11



Objective number : 1.05.1

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

Management unit(s) : 087-51

Criteria : Biological diversity

Issue (value) : Naturally-disturbed forest attributes

Issue clarification : Forests that have been disturbed naturally by fire, insects or wind are very important to wildlife. Among other things, they are a major source of deadwood and provide a diverse structure and favourable range of vegetation by encouraging regeneration. Most of the naturally-disturbed forests in the region are the result of fires. Some burned forests have attributes that increase their value. They include mature forests (larger diameter trees), forests that were less severely burned and burned forests situated near forests that were not burned. Windfall environments are conducive to regeneration and provide an internal structure of interest to wildlife. They are also conducive to the creation of shelters and dens for species including the American marten, black bear and winter wren.

Objective : To ensure the maintenance of attributes specific to naturally-disturbed forests at broader landscape level and in areas covered by special management plans.

Connection with other objectives : Maintenance of species sensitive to forest management (1.07.1) is connected to this objective. The black-backed woodpecker and three-toed woodpecker, two species that are sensitive to management, need naturally-disturbed forests in order to maintain their presence in the area.

Chosen strategy and expected effects

1. Application of ecosystem-based salvage rules for natural disturbances

A provincial ecosystem-based strategy for salvaging wood damaged by natural disturbances has been prepared. The main lines of the strategy are;

- Maintenance of an average of 30% of the disturbed area
- Conservation of representative disturbed stands
- Conservation of forests not affected by the disturbance
- Evenly-distributed residual forest blocks of different shapes
- Protection of soils and water

This will ensure that sufficient quantities of disturbed and undisturbed residual forests are preserved in order to maintain the species associated with the habitats they provide.

Significant activities for the implementation of the strategy:

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

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle

Date : 2022-05-11



Objective number : 1.06.1

Name of objective : Implementing a spatial repartition pattern inspired by natural forest

Management unit(s) : 087-51

Criteria : Biological diversity

Issue (value) : Spatial organization of forests

Issue clarification : The term “spatial organization” refers to the arrangement of stands at different perception levels. The way stands are organized within the landscape affects both biodiversity maintenance and ecological process functions. As part of ecosystem-based management, the aim is to maintain a spatial organization close to that found in unmanaged forests.

Objective : To plan cutblock distribution by emulating natural disturbance pattern. The main aim is to maintain forest blocks and preserve an adequate percentage of residual forests in aggregated cutblocks.

Connection with other objectives : Spatial organization of a forest is important in ensuring the maintenance of species that are sensitive to forest management (objective 1.07.1).

Chosen strategy and expected effects

1. Aggregated cutblocks with residual forest

The spatial organization compartment (COS) is a basic element of forest planning and is used to address the question of spatial distribution. Each management unit is subdivided into spatial organization components, themselves divided fairly evenly into three different size categories (30 to 70 square kilometres, 70 to 110 square kilometres and 110 to 150 square kilometres).

The third level of logging planning involves maintaining at least 30% of the productive area as residual forest in each aggregated cutblock. The residual forest is vital in maintaining biodiversity at disturbance level. Quality, configuration and representativeness criteria are applied to ensure that the residual forest is able to play its role properly.

The use of spatial organization compartments allows disturbances to be distributed more naturally, and the fact of maintaining a good quality, evenly distributed residual forest helps to maintain biodiversity in aggregated cutblocks.

2. Maintenance of large forest tracts

The second level of spatial organization involves maintaining large forest tracts and distributing them throughout the management unit. Forest tracts are forests that cover at least 30 square kilometres, at least 70% of which are composed of trees measuring 7 metres or more in height.

If these core forest areas are spread evenly through the management unit, they will help to maintain biodiversity in the area in general. They also serve as source habitats that species such as the American marten will use as nurseries.

3. 40 % of variable retention cutting

In order to preserve legacies and foster the maintenance of biological diversity, variable retention cutting that retains at least 5% of the stand's merchantable volume should be applied to at least 40% of the area harvested. Variable retention cuts should be spread throughout the management unit, and not grouped into a single sector. This means aiming for at least 20% of variable retention cuts in each planned spatial organization compartment (COS).

There should be a certain amount of diversity in the forms of retention practised in each COS. Within the 40% target, a balance should be achieved between the various forms of retention (small clusters, large blocks (1 to 5 ha), individual trees). Each form has advantages and disadvantages for conservation of biodiversity and landscape aesthetics. Stand type and internal structure, type of environment and harmonization requirements will all influence the choice of treatment.

Variable retention cutting will help to:

- Maintain a certain volume of standing timber that will age
- Foster the creation of germination beds associated with deadwood
- Maintain biodiversity at disturbance (harvest) level. For example, large trees left standing in logging areas will provide perches for birds that hunt in open areas

Significant activities for the implementation of the strategy:

| Step | Significant activities | Responsible | Timeline |
|------|---|----------------|-------------------------|
| 1 | Complete the ecosystem-based management and PAFIO control list. | Forest manager | Each PAFIO modification |

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle

Date : 2022-05-11



Objective number : 1.07.1

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

Management unit(s) : 087-51

Criteria : Biological diversity

Issue (value) : Sensitive species

Issue clarification : The forest serves as the habitat for many wildlife and plant species. Consequently, forest management activities, by altering forest attributes, can have a significant impact on these species' abundance, distribution and survival. The efforts made by ecosystem-based management of forests is the first step in ensuring maintenance of habitats and biodiversity. However, some species have particular needs that cannot necessarily be met by ecosystem-based management. This is why it is so important to incorporate the needs of species at risk and sensitive species in forest management. The aim of this issue is to ensure that the habitat needs of species at risk and species sensitive to forest management are considered during forest planning.

Objective : To consider the habitat needs of sensitive species in the forest management process, in order to ensure that their needs are considered and that management targets and solutions are adapted accordingly.

Connection with other objectives : This objective is connected to all the other objectives. For example, species sensitive to forest management are encouraged by setting targets for variable retention cutting (1.03.1) and partial cutting (1.02.1). They are also encouraged by age structure targets, which control the maintenance of old-growth forests and limit the number of very small stands. Distribution, in time and space, of stand tending treatments in young stands (1.04.1) helps to maintain the habitat of the snowshoe hare, a key species. Maintenance of naturally-disturbed forests (1.05.1) is advantageous to woodpeckers and black bear. Maintenance of wetlands and riparian environments (1.08.2) is also advantageous to sensitive species.

Chosen strategy and expected effects

1. Maintenance of large forest tracts

The second level of spatial organization involves maintaining large forest tracts and distributing them throughout the management unit. Forest tracts are forests that cover at least 30 square kilometres, at least 70% of which are composed of trees measuring 7 metres or more in height.

If these core forest areas are spread evenly through the management unit, they will help to maintain biodiversity in the area in general. They also serve as source habitats that species such as the American marten will use as nurseries.

2. Protected area

Protected areas, biological refuges and exceptional forest ecosystems within an area help to protect old-growth forests and also limit logging.

Maintenance of areas unaffected by logging should help to:

- Improve the maintenance of old-growth forest structures
- Reduce the over-abundance of regenerating stands
- Protect high conservation value elements such as essential habitats

3. Limit the percentage of stand tending treatments

Aim to have at least 50% of young stands between 10 and 25 years of age that have not undergone stand tending treatments for at least five years, in 6,000 hexagon units. Stand tending treatments such as pre-commercial thinning, clearing and cleaning reduce species density and diversity in young stands and hence diminish wildlife habitat quality for a period of up to five years.

By spreading stand tending treatments over time in young, dense habitats suitable for small wildlife, it is possible to ensure that sufficient quantities of these habitats are available at all times.

4. 40 % of variable retention cutting

In order to preserve legacies and foster the maintenance of biological diversity, variable retention cutting that retains at least 5% of the stand's merchantable volume should be applied to at least 40% of the area harvested. Variable retention cuts should be spread throughout the management unit, and not grouped into a single sector. This means aiming for at least 20% of variable retention cuts in each planned spatial organization compartment (COS).

There should be a certain amount of diversity in the forms of retention practised in each COS. Within the 40% target, a balance should be achieved between the various forms of retention (small clusters, large blocks (1 to 5 ha), individual trees). Each form has advantages and disadvantages for conservation of biodiversity and landscape aesthetics. Stand type and internal structure, type of environment and harmonization requirements will all influence the choice of treatment.

Variable retention cutting will help to:

- Maintain a certain volume of standing timber that will age
- Foster the creation of germination beds associated with deadwood
- Maintain biodiversity at disturbance (harvest) level. For example, large trees left standing in logging areas will provide perches for birds that hunt in open areas

5. Targeted degree of alteration by UTA

Every management unit is divided into territorial analysis units (UTAs). For each UTA, targets have been established for old-growth forests and the maximum quantity of regenerating forests. This is the targeted degree of alteration (low, moderate or high). These restrictions on forest age force rotations to become longer in UTAs with too many regenerating forests or not enough old-growth forests, compared to their targets.

This requirement helps to ensure that old-growth forests are distributed throughout the management unit. The application of a requirement at TAU level helps to foster the presence of old-growth forests throughout the management unit.

The management strategy, by preserving a percentage of old-growth forests and limiting the percentage of regenerating forests, reduces the risk of biodiversity loss at UTA level.

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

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

Significant activities for the implementation of the strategy:

| Step | Significant activities | Responsible | Timeline |
|------|--|-----------------|-----------|
| 1 | Identification of regional wildlife needs. | Sophie Dallaire | Done |
| 2 | Identification of critical habitat thresholds and ways of analyzing habitat quality. | Sophie Dallaire | Done |
| 3 | Analyze the quality of the area's habitats and the management strategy's effectiveness in maintaining good quality habitats. | Sonia Légaré | Year 2023 |
| 4 | Identification of solutions to the main issues associated with wildlife species. | Sonia Légaré | Year 2024 |

Issues and Solutions Sheet prepared by : Sonia Légaré

Approved by : Eric Labelle

Date : 2022-05-11



Objective number : 2.01.1

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

Management unit(s) : 087-51

Criteria : Ecosystem condition and productivity

Issue (value) : Forest productivity and sustainability

Issue clarification :

Objective : Maintain the productivity of forest stands at risk of ericaceous invasion. The allowable cut calculations performed by the office of the Chief Forester take into account the impacts of heaths and adjustments to the productivity of these forest layers are made depending on the silvicultural strategies that are applied. The strategies applied will therefore have impacts on the allowable cut calculation.

Connection with other objectives : This objective is connected with the objective of maintaining the productivity of forest ecosystems susceptible to paludification (2.01.2) and with section 59 of the RSDP which prohibits forest management activities in open mossy spruce stands.

Chosen strategy and expected effects

1. Scarification

Scarification followed by reforestation.

Scarification should help to:

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

2. Reforestation (planting or fill planting)

Reforestation and fill planting help restore production to sites containing few desired species or sites with limited productivity.

Reforestation and fill planting promote full afforestation and help maintain productivity in the management unit's forests.

Combined with tending of young stands, they also help to maintain a composition of desired species (e.g. by countering hardwood encroachment).

3. Cutting with protection of high regeneration and soils

Cutting with protection of high regeneration and soils involves cutting all merchantable trees while paying particular attention to the maintenance of high regeneration.

In areas invaded by heath plants, small softwood stems have limited access to nutrient elements and light until they grow to a height of 1 metre. When high regeneration is present and is dense enough to form the next stand, this type of cutting helps to reduce or avoid growth delays due to the presence of heath plants.

Significant activities for the implementation of the strategy:

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

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

Indicator number: 2.01.1.A **Indicator type:** Performance indicator

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

Scale: Management unit

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

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

Frequency: Five-yearly

Breakdown by: Year

Target 60%

Deviation: None

Target and results for each MU

| MU 087-51 | Target 60% | Deviation | 0 % |
|------------------|------------|------------|-----|
| Reference period | Value | Evaluation | |
| | 85,3 % | Green | |
| | 79,5 % | Green | |
| | 81,9 % | Green | |
| | 47,7 % | Yellow | |
| | 95,2 % | Green | |

Information on target:

Timeframe: None

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

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

Indicator monitoring program:

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle

Date : 2022-05-11



Objective number : 3.02.2

Name of objective : Protecting fish habitat, especially spawning grounds

Management unit(s) : 087-51

Criteria : Soil and water

Issue (value) : Water quality and aquatic ecosystem integrity

Issue clarification : It is generally agreed that the road network and its associated disturbances are the main anthropic cause of soil erosion in managed forests. When erosion occurs on or alongside a road, or along or in a watercourse bed, it can cause sediment inflows into the water system. The sediments are likely to cause degradation of aquatic habitats in general and have a particular impact on spawning grounds, invertebrate populations and the free flow of fish. Erosion can also have a detrimental effect on access routes.

Objective : Protect fish habitats in general and spawning grounds in particular.

Connection with other objectives : This objective is connected with the objective of maintaining species sensitive to forest management (1.07.1).

Chosen strategy and expected effects

1. Inclusion of newly identified spawning grounds in forest plans

Inclusion of newly identified spawning grounds in forest plans requires good communication and monitoring. New identifications may be made via reporting or consultations. When new identifications are received, they are sent to the Direction de la gestion de la faune, for verification. Habitat protection rules are applied in the meantime, until the results of the verification are known.

Inclusion of newly identified spawning grounds in forest plans helps to protect these sensitive habitats. The interim protection process ensures that the habitat is preserved until it appears on the digital information layers used for forest planning.

2. Apply watercourse standards

Apply the current regulations (RSFM/RSFD) shown in the contractual harvesting requirements and monitor compliance of operations.

Compliance with current regulations should help reduce the impacts of forestry operations on aquatic ecosystems. Annual monitoring will also enable immediate remedial action to be taken when a probable case of erosion is found, and will also help ensure that there are no recurrent sediment inflows into watercourses.

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

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

Significant activities for the implementation of the strategy:

| Step | Significant activities | Responsible | Timeline |
|------|---|--------------------------|---------------|
| 1 | Forward reports of habitats (especially spawning areas) received during consultations to the Direction de la gestion de la faune. | Consultation responsible | All year long |

| | | | |
|---|--|---------------------|------------------|
| 2 | Apply the conditions set out in the RSFD for habitats until the report has been verified by the Direction de la gestion de la faune. | All employees | All year long |
| 3 | Include valid habitats (especially spawning grounds) on the layers used by forest planners. | Geomatic department | After validation |

Indicator number: 3.02.2.A **Indicator type:** Performance indicator

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

Scale: Site

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

Useful definitions:

Frequency: Yearly

Breakdown by:

Target 100% of the spawning sites reported

Deviation: None

Target and results for each MU

| MU | Target | Deviation |
|-----------|-------------------------------------|-----------|
| MU 087-51 | 100% of the spawning sites reported | 0 % |

Information on target:

Timeframe:

Documentation:

Indicator monitoring program:

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle

Date : 2022-05-11

5. References

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

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

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