TACTICAL INTEGRATED FOREST MANAGEMENT PLAN 2018-2023 REVISED IN 2020

Nord-du-Québec Region

Management unit 86-52

Unité de gestion Harricana-Nord (106)

Direction générale du secteur nord-ouest
Le 9 octobre 2020

MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS

COURTESY TRANSLATION

In the event of a difference in interpretation due to translation, the French version is considered the official document

Votre gouvernement

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Note : the members of the Joint Working Group (JWG) helped provide information for drafting the Cree section as well as recommendations for improving this document.

NOTE TO THE READER

This document was prepared for public consultation and will help meeting certain requirements of forest certification. It presents the changes prepared between 2018 and 2019 by MFFP in collaboration with local integrated land and resource management panels (TLGIRTs) and Aboriginal communities. It will succeed the 2018–2023 PAFIT in force since April 2018.

Seven (7) PAFIT document were prepares for the seventeen (17) Nord-du-Québec management units (MUs). The management units (MUs) were grouped by MFFP local office and by the forest regime they follow: the Adapted Forestry Regime (where Chapter 3 of the Paix des Braves applies) or the standard forestry regime:

1) PAFIT 026-61, 026-62, 026-63, 026-64, 026-65, 026-66 (UG 102, adapted regime)
2) PAFIT 085-51 (UG 105, standard regime)
3) PAFIT 085-62 (UG 105, adapted regime)
4) PAFIT 086-52 (UG 106, standard regime)
5) PAFIT 086-63, 086-64, 086-65, 086-66 (UG 106, adapted regime)
6) PAFIT 087-51 (UG 107, standard regime)
7) PAFIT 087-62, 087-63, 087-64 (UG 107, adapted regime)

The Unité de Gestion de Chibougamau (UG102) is based in Chibougamau.
The Unité de Gestion Mont Plamondon (UG 105) is based in La Sarre.
The Unité de Gestion de l'Harricana-Nord (UG 106) is based in Amos.
The Unité de Gestion Quévillon (UG 107) is based in Lebel-sur-Quévillon.

The reasons for these groupings are as follows:

1) We have a large number of management units in our region (17 in all, 14 of which are affected by the Adapted Forestry Regime).
2) A significant portion of the plan concerns all of the MUs in the region.

This allows MFFP to spend less time duplicating documents and gives regional partners all the information they need to understand the plan within at most seven documents instead of seventeen.

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AIPL	Aire d'intensification de la production ligneuse	High yield wood production areas	AIPL
	Aire protégée	Protected area	
ADF	Aménagement durable des forêts	Sustainable forest development	SFD
BCL	Barrette-Chapais Ltée	Barrette-Chapais Ltée	BCL
BFEC	Bureau du Forestier en chef	Chief forester office	
BGA	Bénéficiaire de garantie d'approvisionnement	Timber supply garantee holder	BGA
BMMB	Bureau de mise en marché des bois	Wood marketing board (Timber marketing board)	BMMB
CCL	Les Chantiers Chibougamau Ltée	Les Chantiers Chibougamau Ltée	CCL
CPF	Calcul de la possibilité forestière	Yield determination (Allowable cut calculation)	
CRRNT	Commission régionale sur les ressources naturelles et le territoire	Regional land and natural resources commission	CRRNT
DGS	Direction générale de secteur	Sector directorate	DGS
ENRQC	Entente concernant une nouvelle relation entre le gouvernement du QC et les Cris du Québec	Agreement concerning a new relationship between Quebec Government and Crees of Quebec	ANRQC
	Fermeture de chemin	Road closure	
FEC	Forestier en Chef	Chief forester	
FSC®	Forest Stewardship Council®	Forest Stewardship Council®	FSC®
GA	Garantie d'approvisionnement	Timber supply garantee	
	Grands enjeux	Major issues	
GNC	Gouvernement de la nation crie	Cree Nation Government	CNG
GTC	Groupe de travail conjoint	Joint working group	JWG
LADTF	Loi sur l'aménagement durable du territoire forestier	Sustainable Forest Development Act	SFDA
MERN	Ministère de l'Énergie et des Ressources naturelles	Ministère de l'Énergie et des Ressources naturelles	MERN
MFFP	Ministère des Forêts de la Faune et des Parcs	Ministère des Forêts, de la Faune et des Parcs	MFFP
MH	Mesure d'harmonisation	Harmonisation Measure	HM
	Intervenants forestiers	Forest stakeholders	
PAFI	Plan d'aménagement forestier intégré	Integrated Forest Management Plan	PAFI
PAFI-O	Plan d'aménagement forestier intégré opérationnel	Integrated Forest Management Plan - Operational	PAFIO
PAFI-T	Plans d'aménagement forestier intégré tactiques	Integrated Forest Management Plan - Tactical	PAFIT
PAIF	Plan annuel d'interventions forestières	Annual forest management plan (was before 2013)	AFMP
Paix des braves	Entente concernant une nouvelle relation entre le gouvernement du Québec et les Cris du Québec (ENRQC, chapitre 3)	Agreement concerning a New Relationship between le Gouvernement du Québec and the Crees of Québec (chapter 3 - ANRQC)	Paix des braves
PFNL	Produits forestiers non-ligneux	Non timber forest products	PFNL
PGAF	Plan général d'aménagement forestier	General forest management plan (was before 2013)	GFMP
	Possibilité forestière	Annual allowable cut	
PRAN	Programmation annuelle	Annual selection	PRAN

List of acronyms and appellations

PRAU	Permis de récolte aux fins de l'approvisionnement d'une usine de transformation du bois	Permit to harvest timber to supply a wood processing plant	PRAU
PRDIRT	Plan régional de développement intégré des ressources et du territoire	Regionalized and integrated natural resources and teritory developement plan	PRDIRT
	Principe de précaution	Precautionary approach	
®	Marque déposée	Registered trademark	
RFA	Régime forestier adapté	Adapted forestry regime	AFR
RADF	Règlement sur l'aménagement durable des forêts du domaine de l'État	Sustainable forest management *rules*	
RAIF	Rapport annuel d'interventions forestières	Annual forest managment report	
	Réserve faunique	Wildlife reserve	
SADF	Stratégie d'aménagement durable des forêts	Sustainable forest management strategy	
SFI	Sustainable Forestry Initiative	Sustainable Forestry Initiative	SFI
SIP	Secteur d'intervention potentiel	Potential intervention sector	PIS
TGIR	Table de gestion intégrée des ressources - Terres II	Integrated resource management table - Category II land	TGIR
TLGIRT	Table locale de gestion intégrée des ressources et du territoire – Terres III	Local integrated land and resource management panels – Category III land	TLGIRT
TSNC	Travaux sylvicoles non commerciaux	Non commercial silvicultural works	
UA	Unité d'aménagement	Management unit	MU
UG	Unité de gestion	MFFP local Office (ex. UG Chibougamau)	
VOIC	Valeurs, objectifs, indicateurs et cibles	Values, objectives, indicators and targets	VOIT
ZIP	Zone d'intervention potentielle	Potential forest operation zone	ZIP
	Plan de protection et d'aménagement de l'habitat du caribou des bois	Woodland caribou habitat protection and management plan	
	Règles internes de fonctionnement	Internal operating rules	IOR

For more information about acronyms (French only) :

https://mffp.gouv.qc.ca/forets/vocabulaire/forets-acronyme.jsp

MFFP glossary (French only):

http://glossaire-forestier.mffp.gouv.qc.ca/

PART 1: GENERAL INFORMATION

1 Legal context

1.1 Provisions concerning forest management activities

The MFFP is responsible for the use and development of land, forestry and wildlife resources. More specifically, it manages all elements relating to the sustainable development of forests in the domain of the State. It encourages the development of the forest product industry and private forests. It also prepares and implements research and development programs to obtain and circulate knowledge of topics connected with sound forest management and forest product processing. In addition, it is responsible for carrying out forest inventories, producing seedlings and plants for reforestation, and protecting forest resources against fire, disease and insect infestations.

Since April 2013, all forest management activities have been governed by the Sustainable Forest Development Act. According to section 1 of the Act, the forest regime is designed to (1) implement sustainable forest development, in particular through ecosystem-based development; (2) ensure integrated and regionalized resource and land management based on clear, consistent objectives, measurable results and the accountability of managers and users of the forest; (3) determine how responsibilities under the forest regime are shared between the State, regional bodies, Native communities and users of the forest; (4) follow up and monitor forest operations in forests in the domain of the State; (5) govern the sale of timber and other forest products on the open market at a price reflecting their market value, and the supply of timber to wood processing plants; (6) regulate the development of private forests; and (7) govern forest production activities.

The main rights granted in the management units are supply guarantees and permits to harvest timber to supply a wood processing plant. These two instruments are designed to provide secure access to timber and maintain stable supplies. The MFFP broadens access to timber by auctioning volumes of wood from the public forest, as a means of adjusting its management methods to the situation and needs of local and regional communities.

According to section 54 of the Sustainable Forest Development Act:

“The Minister draws up a tactical plan and an operational plan for integrated forest development for each management unit, in collaboration with the local integrated land and resource management panel (TLGIRT) set up for the unit under the Act respecting the Ministère des Affaires municipales, des Régions et de l’Occupation du territoire (chapter M-22.1). When drawing up the plans, the Minister may also retain the services of forest planning experts.

The tactical plan contains, among other things, the allowable cuts assigned to the unit, the sustainable forest development objectives, the forest development strategies adopted to ensure that allowable cuts are respected and objectives are achieved, and the location of the main infrastructures and the areas of increased timber production. This plan covers a five-year period.

The operational plan basically sets out the forest operations zones in which timber harvesting or other forest development activities are planned under the tactical plan. It also contains the harmonization measures adopted by the Minister. The operational plan is updated from time to time, to allow for, among other things, the gradual addition of new zones in which forest operations may be carried out.
The Minister prepares, keeps up to date and makes public a manual for the preparation of plans, and guides that the Minister follows to prepare silvicultural prescriptions.”

According to section 55 of the Act:

“The TLGIRT is set up in order to ensure that the interests and concerns of the persons and bodies affected by planned forest development objectives are taken into account, to define local sustainable forest development objectives and to agree on measures to harmonize the use of resources. The composition and operation of a TLGIRT, including its dispute resolution mechanisms, are the responsibility of the Minister or, if applicable, the responsible bodies referred to in section 21.5 of the Act respecting the Ministère des Affaires municipales, des Régions et de l’Occupation du territoire (chapter M-22.1). The Minister or body must, however, invite the following persons or bodies, or their representatives, to sit on the TLGIRT:

1. the Native communities, represented by their band council;
2. the regional county municipalities and, if applicable, the metropolitan community;
3. the holders of a timber supply guarantee;

4. the persons or bodies that manage controlled zones;
5. the persons or bodies authorized to organize activities, provide services or carry on a business in a wildlife sanctuary;
6. the holders of an outfitter's licence;
7. the holders of a sugar bush management permit for acericultural purposes;
8. the lessees of land for agricultural purposes;
9. the holders of trapping licences who hold a lease of exclusive trapping rights;
10. the regional environmental councils."

According to section 57 of the Act:

Integrated forest development plans must be the object of a public consultation held by the body responsible for the composition and operation of the TLGIRT or, if applicable, by the regional county municipality to which that responsibility was entrusted under section 55.1. The conduct of the public consultation, its duration, and the documents that must accompany the plans during the consultation are defined by the Minister in a manual which the Minister makes public.

If the Minister holds a consultation, the Minister prepares a report summarizing the comments obtained during the consultation. If the consultation is held by a responsible body referred to in section 21.5 of the Act respecting the Ministère des Affaires municipales, des Régions et de l'Occupation du territoire (chapter M-22.1) or by a regional county municipality, the body or municipality, as applicable, prepares and sends to the Minister, within the time determined by the Minister, a report summarizing the comments obtained during the consultation and, in the case of a divergence in points of view, proposes any solutions.

The consultation report is made public by the Minister.

According to section 58 of the Act:

"Throughout the process leading to the drafting of the plans, the Minister sees that forest planning is founded on ecosystem-based development and on integrated and regionalized land and resource management."

According to section 40 of the Act:

The Minister may, for all or part of the forest, impose on persons or bodies subject to a development plan forest development standards different from those prescribed by government regulation, when existing government standards do not provide adequate protection for all the resources of the forest due to the characteristics of the forest and the nature of the project to be carried out. The Minister may also, at the request of a Native community or on the Minister's own initiative after consulting the Native community, impose different forest development standards to facilitate the conciliation of forest development activities with the domestic, ritual or social activities pursued by the community, or to implement an agreement that the Government or a minister enters into with the community.

The Minister may also authorize a departure from the regulatory standards if it is shown that the substitute measures proposed by persons or bodies subject to a development plan offer equivalent or superior protection for forest resources and the forest environment.

The Minister defines, in the plan, the forest development standards imposed or authorized and specifies the places where they are applicable, any regulatory standards they replace, and the mechanisms for ensuring their application. The Minister specifies, in the plan, from among the fines prescribed in section 246, the one to which an offender is liable for a given offence.

1.2 Provisions relating to Aboriginal communities

The integrated forest management plan (PAFI) for the management units in the Nord-du-Québec region are carried out in a highly specific legal context, that of the James Bay and Northern Québec Agreement (JBNQA) and its various implementation laws.

The PAFI consultations for nations that are not signatories of the JBNQA – the Algonquins for MU 085-51, 086-52 and 087-51 and the Atikamekw for MU 087-51 – are carried out in much the same way as in the rest of the province, based on guidelines given in the *Manuel de consultation des communautés autochtones sur les plans d'aménagement forestier intégré : http://mffp.gouv.qc.ca/wp-content/uploads/201709-27_DO.pdf.*

Consideration of the interests, values and needs of the Aboriginal communities that live in the forest forms an integral part of sustainable forest development. For example, the communities are invited to take part in the work of the TLGIRTs. Separate consultations are also held for Aboriginal communities affected by forest plans, in order to identify their concerns about the potential impacts of the plans on their domestic, ritual and social activities. Based on the results of these consultations, the concerns, values and needs of

the Aboriginal communities are taken into consideration in both sustainable forest development and the forest management process.

In the case of the Cree, forest management planning, participation, consultation and plan updates are clearly structured by the adapted forestry regime outlined in the *Agreement Concerning a New Relationship Between le Gouvernement du Québec and the Crees of Québec* (known as the *Paix des Braves).* The adapted regime in Chapter 3 of the Paix des Braves is the realization of the Section 30A issue from the supplementary convention of the JBNQA.

In addition to the conditions concerning the statistical monitoring of disturbances per Cree trapline, the adapted forestry regime is designed to take into consideration the concerns, values and needs of Cree communities located in the forestry territories. This consideration is an integral part of sustainable forest management. Besides participation in and consultation with the Cree tallymen on the development of forest management plans, the new adapted forestry regime of the *Paix des Braves* provides for the creation of two types of local management tables for the separate territories. The Cree Nation Government created an integrated resource management table (TGIR) to manage and make forest development decisions for the Category II lands, and the Eeyou Istchee James Bay Regional Government created nine TLGIRTs to do likewise for the Category III lands.

Add to this context, there are also several region-specific agreements that affect the planning and implementation of development activities. These agreements, entered into with the Cree Nation, include the *Agreement Concerning a New Relationship Between le Gouvernement du Québec and the Crees of Québec*, commonly known as the Paix des Braves, and the Agreement on Governance in the Eeyou Istchee James Bay Territory, and are described in section 1.5 of this plan. In addition, details of Aboriginal community consultations under the JBNQA and special agreements can be found in section 5.3.

As mentioned in the section dealing with the legal context, the Minister may, under section 40 of the *Sustainable Forest Development Act*, impose different forest management standards to facilitate the conciliation of forest management activities with the activities of an Aboriginal community.

An RADF derogation is attached to this PAFIT in Appendix.

1.3 Certification

Forest certification is an external verification process designed to certify areas in which forest resources are managed and developed by organizations that apply sustainable development principles. These principles are defined by different forest certification systems, and the ensuing standards reflect global forestry issues as well as the values and sometimes the specific aspects of Canada's main ecological regions.

Three forest certification systems, governed by the following three bodies, can be used in Québec:

- The Canadian Standards Association (CSA) for sustainable forest development;
- The Forest Stewardship Council® (FSC®);
- The Sustainable Forestry Initiative (SFI).

Among other things, forest certification helps to meet market demands. It provides an acknowledgement, by a neutral, internationally-recognized organization, of the quality of the forestry practices used and compliance with the principles of sustainable development.

In Québec's public forests, the forestry companies are responsible for obtaining forest certification. The MFFP works with them, within the bounds of its responsibilities, to help them obtain or maintain certification.

Companies that opt for forest certification are free to select the certification that best meets their needs, based on their market.

The MFFP does not favour any specific forest certification system. However, it feels that certification provides an additional acknowledgement of the quality of development practices carried out under Québec's forest regime.

On January 29, 2015, the Ministère des Forêts, de la Faune et des Parcs and the Québec Forest Industry Council (CIFQ) reviewed the 2013 MFFP-CIFQ Agreement to make sure the forest planning mechanism was effective and give certification applicants an opportunity to be involved in the steps of the tactical and operational planning process required for certification purposes (CSA, FSC and SFI). The exchange and collaboration mechanisms provided for in the agreement are designed to ensure that supply guarantee holders are able to meet the requirements for certification.

The proposed mechanism also takes into account the respective responsibilities of the MFFP and the forest industry under the Sustainable Forest Development Act (SFDA), and ensures that the aims of the forest regime review are fulfilled. The new method was introduced to ensure that the strategies used to guide forest planning meet the requirements for forest certification. Operational panels have been set up to coordinate certification needs with the tactical and operational plans.

Table 1 : Forestry certification Portrait in Nord-du-Québec

MU	FSC	Cerficicate holder	SFI	Certificate holder
026-61	**X**	CCL	**X***	
026-62	**X**	CCL		
026-63			**X***	BCL
026-64	**X**	CCL	**X***	
026-65			**X***	BCL
026-66			**X***	BCL
085-51	**X**	RYAM	**X**	Norbord
085-62	**X**	RYAM		
086-52			**X**	Norbord
086-63	**X**	EACOM	**X**	EACOM
086-64	**X**	EACOM	**X**	EACOM
086-65			**X**	PFR
086-66			**X**	PFR
087-51	**X**	PFR	**X**	PFR
087-62			**X**	BCL
087-63			**X**	PFR
087-64			**X**	PFR

Data in effect as of November 10, 2019

*Partial SFI certification: Corresponds to the area equivalent to the supply guarantee volume used by BCL and BMMB from MU 026-65 and 026-66.

FSC : Forest Stewardship Council

SFI : Sustainable Forestry Initiative

CCL : Les Chantiers Chibougamau

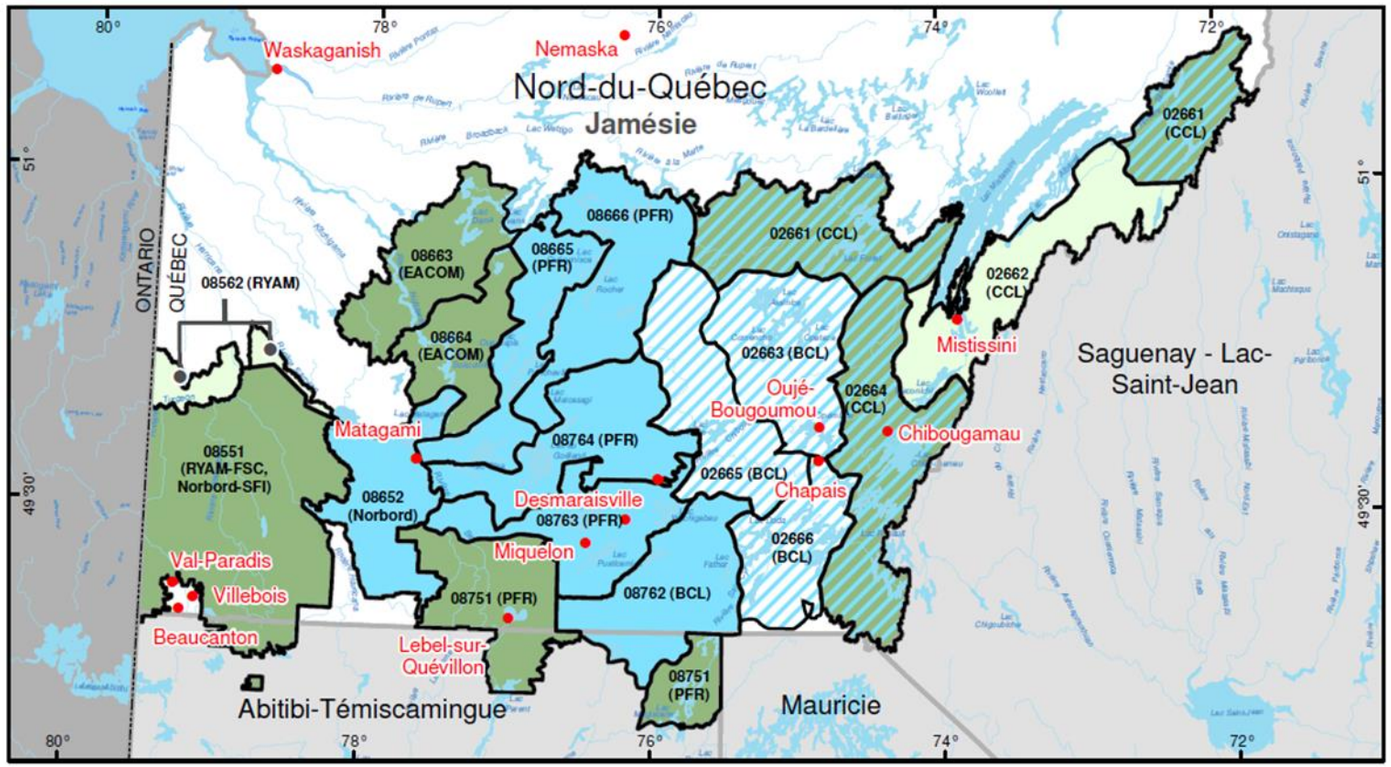
BCL : Barrette-Chapais

PFR : Produits forestiers Résolu

RYAM : RYAM Gestion forestière

EACOM : EACOM Timber Corporation

Map 1 : Forestry certification Portrait in Nord-du-Québec



Forestry certification

- FSC[1]
- SFI[2]
- SFI partielle
- FSC et SFI
- FSC et SFI partielle

Others

- Locality
- MU limit
- Administrative limit

Projection cartographique

MTU[3] zone 18, NAD83

0 80 Km

1 : 2 700 000

Sources

Données	Organisme	Année
FCAN[4]	RNC[5]	2011
BDGEOM[6]	MFFP[7]	2019

Réalisation

Ministère des Forêts, de la Faune et des Parcs
Direction de la gestion des forêts du Nord-du-Québec

Notes :
1- Conseil de soutien de la forêt (Forest Stewardship Council)
2- Système de certification forestière (Sustainable Forestry Initiative)
3- Mercator transverse universelle
4- Fond de carte de l'Atlas national pour le Québec et l'Ontario
5- Ressources Naturelles Canada
6- Base de données géomatiques régionale
7- Ministère des Forêts, de la Faune et des Parcs

Forêts, Faune et Parcs
Québec

1.4 The environmental management and sustainable forest development system

The Regional Operations Sector (ROS) has established and adopted an environmental and forest-related policy, which reasserts its commitment to:

- comply with or exceed legal requirements;
- improve its environmental and forest-related performance continuously;
- prevent, reduce and fight pollution;
- act as an informed owner.

To implement its environmental and forest-related policy, the ROS has deployed an environmental management system that forms a basis for the policy and is consistent with sustainable forest development criteria.

The system applies to SFDA activities relating to forest plans, contract and agreement management, and monitoring and control of associated forestry work.

Companies that carry out forest management work for the MFFP also generate impacts for the environment. For this reason, they shall also hold a certificate recognized by the Minister (ISO 14001 or forest management company certification [CEAF]) to demonstrate control of environmental impacts of their own activities, all in accordance with Section 62 of the Sustainable Forest Development Act (SFDA). This level of accountability for forest management companies supports the MFFP by helping to ensure that all forest development work is implemented and monitored using sound environmental management practices. It is also a way of harmonizing practices, normalizing standards, facilitating communications between the MFFP and its collaborators, and promoting the maintenance of forest certification.

1.5 Forest Management: Background Information

In the last 40 years, a number of initiatives have been introduced to revise Québec's forest regime, recommend changes and adjust the policies and the legislative framework governing public forest management.

Québec's forest policy in 1972.

Its main aim was to separate timber allocation from forest resource management. The proposed reform was based on the fact that, as the need for timber and woodland space for other purposes increased, the State would have to be much more firm and direct in its administration of the forests. Public forest management could not be left in the hands of timber users, because they had to produce financial results in the short term, whereas forest management required a longer-term view. The State, which until then had simply been the custodian of the forest resource, now wanted to play an active role in managing that resource for the well-being of the community. A decision was therefore made to abolish the forest concession system.

The new forest policy in 1986.

This marked a major shift in perspective, since the Government decided to introduce a new timber allocation method, known as the timber supply contract (contrat d'approvisionnement) and forest management agreement (TSFMA). Under the new policy, the Government granted an agreement holder, each year, in a specific forest area, the right to obtain a permit to harvest a volume of standing timber, and in return, the holder was given the task of developing the forest in its specific area. In other words, responsibility for resource management was handed back to the timber users, under the Department's supervision.

The Forest Protection Strategy in 1994.

This time, the Council of Ministers decided to prepare a strategy with orientations that would help reduce pesticide use while ensuring sustained timber production. The Strategy was the product of an extensive consultation process in 1991, during which the Bureau d'audiences publiques sur l'environnement (BAPE) visited more than 70 towns and villages in Québec. It reflected the most urgent concerns and demands of a general public anxious to bequeath sound, well-managed forests to future generations. In publishing the Forest Protection Strategy, the Government announced a principle of primary importance for prevention, namely the fact of giving priority to natural regeneration and banning the use of pesticides in forest management.

The review of the forest regime in 2000.

The Forest Act was amended following a consultation process to identify the public's expectations, which included more protected areas, the preservation of old-growth forests, socially acceptable logging patterns, and a management-by-results approach favouring companies that performed well. The amendments also reinforced the forest's heritage role and confirmed the Government's desire to lay the foundations for a participatory form of management, through provisions that required it to consult the general public on its forest

protection and development orientations, and to involve other forest users in the planning process overseen by agreement holders.

The Agreement concerning a New Relationship between le Gouvernement du Québec and the Crees of Québec (Paix des Braves) in 2002

Chapter 3 of the Agreement introduces an adapted forest regime that governs planning of forest management, participation, consultation and reviews of plans within the area covered by it. The Agreement has been amended six (6) times since it was signed in 2002. In this region, only the management units 085-51, 086-52, 087-51 are not concerned by the adapted forestry regime. Limits to the territory of application of chapter 3 of the Agreement are shown at section 2 ‘’First Nations’’.

The Sustainable Forest Development Act, which has regulated forest development activities since April 2013.

The Act introduces a number of innovations to the forest management process. Québec’s aim in taking this new approach is to ensure the sustainability of its forest resources, protect forest diversity, allow the regions and communities to play a more direct role in forest management, address the development and profitability of the forest products industry, incorporate the values and knowledge of Aboriginal communities, and provide stimulating jobs in the communities and regions while allowing them to prosper.

The Agreement on Governance in the Eeyou Istchee James Bay Territory between the Crees of Eeyou Istchee and the Gouvernement du Québec, 2012.

The Québec Government and the Cree Nation signed the Agreement on Governance in the Eeyou Istchee James Bay Territory on July 24, 2012. The purpose of the Agreement was to continue the area’s development by granting the Crees additional responsibility over land and resources. Among other things, and subject to prior negotiations between the MFFP and the Cree Nation Government, the Agreement provided for the creation of a collaborative forest resource management regime on Category II lands in the area covered by Chapter 3 of the Paix des Braves. The Agreement also provided for the creation of the Eeyou Istchee James Bay Regional Government (the Regional Government), which took office on January 1, 2014, and is composed of 22 people: 11 Cree representatives and 11 Jamésiens representatives. One observer from the Québec Government also attends all the meetings. The Regional Government replaced the Municipalité de Baie-James, other than for Category II lands. It also has the responsability of the TLGIRTs for Category III lands.

2 First Nations

2.1. Overview of the Aboriginal communities inhabiting Nord-du-Québec region

The management units in Nord-du-Québec are used by the Algonquin, Atikamekw, and Cree Nations for many purposes, including hunting, fishing, and trapping. The specific communities that use this land are the Algonquin communities of Lac-Simon and Pikogan, the Atikamekw community of Opitciwan, and the Cree communities of Mistissini, Nemaska, Oujé-Bougoumou, Waskaganish, and Waswanipi.

Table 2 : Aboriginal communities using the land under forest management in Nord-du-Québec who are not signatories to the JBNQA

Nation and MU associated for consultation	Community	Population[1]	Name of Reserve	Location of Reserve	Area of Reserve[2]
Atikamekw (087-51)	Opitciwan	2 955	Obedjiwan	North shore of Réservoir Gouin, 143 km south of Chibougamau	935 ha
Algonquin (085-51*, 086-52)	Conseil de la Première Nation Abitibiwinni	1 075	Pikogan	3 km north of the town of Amos	89 ha
Algonquin (086-52, 087-51)	Conseil de la nation Anishnabe de Lac-Simon	2 195	Lac-Simon	32 km southeast of Val-d'Or	326 ha

* The Cree community of Waskaganish also uses a portion of MU 085-51.

Table 3 : Aboriginal communities affected by the Paix des Braves Adapted Forestry Regime who are signatories to the JBNQA

Nation and MU associated for consultation	Community[3]	Registered Population[4]	Location of Community	Area of IA lands	Area of IB lands
Cree (026-61, 026-62, 026-63, 026-64)	Cree Nation of Mistissini (Mistissini)	4 061	On the shores of Lac Mistassini, 84 km northeast of Chibougamau	854,3 km^2	526,1 km^2
Cree (086-63)	Cree Nation of Nemaska (Nemaska)	804	160 km east of Waskaganish, alongside Lac Champion	97,4 km^2	55,4 km^2
Cree (026-63, 026-64)	Oujé-Bougoumou Cree Nation (Oujé-Bougoumou)	894	26 km north of Chapais, alongside Lac Opémisca	100 km^2	67 km^2
Cree (085-62, 086-63)	The Crees of the Waskaganish First Nation (Waskaganish)	2 885	South of Baie James alongside Baie de Rupert	492,5 km^2	295,5 km^2
Cree (026-65, 026-66, 086-64, 086-65, 086-66, 087-62, 087-63, 087-64) 084-62 (located in the administrative region of Abitibi-Témiscamingue, but included in the JBNQA and ANRQC)	Waswanipi	2 261	Alongside Rivières Waswanipi and Chibougamau, about 150 km west of the town of Chibougamau	364,5 km^2	233,5 km^2

* The Cree community of Waskaganish also uses a portion of MU 085-51 located outside the ANRQC.

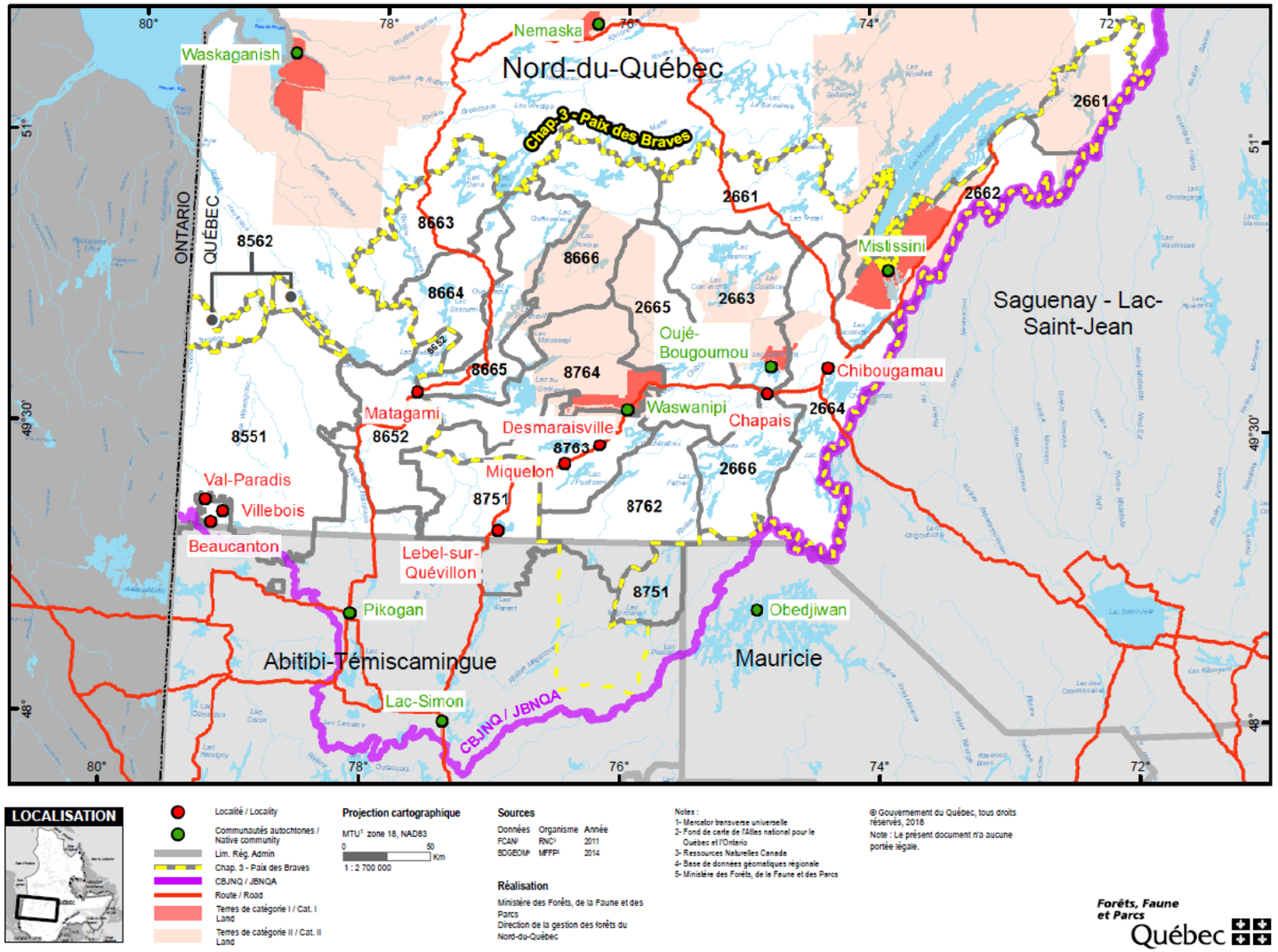
[1] Population inscrite au mois de mars 2018, y compris une proportion de membres vivant hors réserve. https://www.aadnc-aandc.gc.ca/Mobile/Nations/carte1200/carte-fra.html Données au 23 avril 2018.

[2] http://www.aadnc-aandc.gc.ca/Mobile/Nations/carte1200/carte-eng.html Accessed April 23, 2018.

[3] Official names listed in First Nations profiles maintained by the Government of Canada http://www.aadnc-aandc.gc.ca/Mobile/Nations/carte1200/carte-eng.html

[4] Registered population as of March 2018, including some members living outside the reserve. http://www.aadnc-aandc.gc.ca/Mobile/Nations/carte1200/carte-eng.html Data as of April 23, 2018.

Map 2 : Algonquin, Atikamekw and Cree communities related to the Nord-du-Québec management units



Aboriginal communities affected by MU 086-52

This section of the PAFIT gives an overview of the Algonquin Nation and the two Aboriginal communities affected by forest management in MU 086-52: Conseil de la Nation Anishnabe de Lac-Simon and Conseil de la Première Nation Abitibiwinni (Pikogan).

The territory covered by management unit 086-52 is located in the Abitibi Reserve for beaver.

> Beaver reserves were created between 1932 and 1954 to allow beaver populations to rebuild. According to the provisions of the *Regulation respecting beaver reserves* (L.R.Q., chap. C-61.1, r.28), only “Indians and Eskimos” may hunt and trap fur-bearing animals in certain beaver reserves.
>
> **For more information about beaver reserves:**
>
> http://legisquebec.gouv.qc.ca/en/ShowDoc/cr/C-61.1,%20r.%2028

2.2. Overview of the Algonquin Nation

The Algonquin Nation in Québec has just over 11,000 members, roughly 6,000 of whom live in nine communities across Abitibi-Témiscamingue and Outaouais. They speak Algonquin, French, and English. For more information on the Algonquin communities:

http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Index.aspx?lang=eng

The Algonquin communities’ economic activity has changed significantly in recent decades. Today it is centered around logging, tourism, handicrafts, and government services. A number of communities are working to spur economic growth in the foresty sector through silvicultural activities. Depending on their interests, they participate in tree planting, site preparation, or education of the tree stands. Some communities also want to take part in harvesting activities, either for tree felling or road building/repairing. These forest management activities create jobs for members of the Algonquin communities and serve as a source of income for the communities.

2.2.1. Algonquin community of Lac-Simon

The community of Lac-Simon includes 2,195 members and is located near the town of Val-d’Or (Louvicourt sector), via Route 117 on the western shore of Lac Simon.

The community formed a company called Menitik Resources to create permanent forest jobs for its members. The company does tree planting, brush cutting, and timber harvesting work and receives a recurring annual volume of silvicultural work. The Lac-Simon community, Rexforêt, and MFFP have been working together for several years to train community members in various specializations such as site preparation, tree planting, brush cutting, tree felling, and trail building. A number of students have earned diplomas in these disciplines.

The Lac-Simon community has created a forestry department to gather trapping managers’ concerns (tallymen) and information on traditional activities of community members. The Ministry meets regularly with the community's forestry department to discuss members’ concerns about forest management.

2.2.2. Algonquin community of Abitibiwinni (Pikogan)

The community of Pikogan has 1,075 members and is located three kilometers from the town of Amos, on the western shore of Rivière Harricana. Members of the Pikogan community call themselves Abitibiwinnik, in reference to Lac Abitibi. The community’s territory currently covers more than 277 hectares and each family uses a territory and camps north of the 49th parallel.

The Pikogan community has created an environment department to study forest plans, harmonize forest activities, help develop forest-related businesses, help community members access the territory, participate in regional environmental decision-making activities, and study laws and regulations applicable to the environment, mineral exploration and mining, and use of forest and wildlife resources. The Ministry meets regularly with the community to discuss members' concerns about forest management.

2.3. Plan Nord and The Grande Alliance

2.3.1. Plan Nord

The aim of the Plan Nord is to promote the potential for mining, energy, tourism, and social and cultural development in Québec north of the 49th degree of latitude. It will create jobs and wealth for northern communities and for Québec as a whole, while ensuring respect for the northern population and the environment. By harmonizing the economic, social and

environmental aspects of the Plan Nord, the Québec government intends to make it a responsible, sustainable and unifying project for Québec society.
Source: https://plannord.gouv.qc.ca/en/

The Plan Nord offers an opportunity to establish and specify conservation measures to protect 50% of the land lying north of the 49th parallel from industrial activities, including a measure to establish protected areas. As part of this process, the Québec government's target is to ensure that, by 2020, 20% of the area covered by the Plan Nord is made up of protected areas, of which at least 12% will comprise boreal forest north of the 49th parallel. Steps will also be taking to implement a mechanism for the priority allocation of the remaining 30% of the area for non-industrial activities. This part of the North will be dedicated to the protection of the environment, the safeguarding of biodiversity and the promotion of various types of development. The government intends to continue the process to establish national parks as part of the implementation of the Plan Nord.

Source: https://plannord.gouv.qc.ca/en/priority-actions/protection-environment-biodiversity-conservation/
Source: https://plannord.gouv.qc.ca/wp-content/uploads/2015/04/Carte-8-ANG.pdf

The work resulting from the Plan Nord concerning protected areas will be taken into consideration in the PAFITs of the Nord-du-Québec region when they are subject to administrative or legal protections as explained in section 6.3.

2.3.2. The Grande alliance

The agreement for collaboration and consolidation of socio-economic ties between the Cree Nation and Quebec government to connect, develop and protect the territory (Grande Alliance) in 2020.

On February 17, 2020, the Government of Quebec and the Cree Nation signed the memorandum of understanding on the Cree-Quebec Sustainable Infrastructure Development Program in the Eeyou Istchee Baie-James region. A "Grande Alliance" is established between Quebec and the Crees in order to promote and consolidate sustainable development and socioeconomic collaboration between the Cree and Quebec nations, in order to link, develop and protect the region. Eeyou Istchee Baie-James. This agreement, which is in keeping with the Government's desire to broaden the collaboration initiated in 2002 through the Agreement Concerning a New Relationship between le Gouvernement du Québec and the Crees of Quebec (Paix des braves), aims among other things the identification of new protected areas conducive to the connectivity of the territory's wildlife habitats.

The collaboration agreement provides, in particular, for the extension of the rail network to promote economic development, the sharing of infrastructures in the territory and the local labour force training in the common interest of communities and public and private enterprises.

Due to the recent signing of this memorandum of understanding, this PAFIT does not contain anything related to the Grand Alliance.

3 Provincial Orientations

3.1 Sustainable Forest Management Strategy (SADF)

The Sustainable Forest Management Strategy sets out the chosen vision, along with guidelines and objectives for sustainable forest management, in particular with regard to ecosystem-based management. It also defines the mechanisms and methods that will be used to implement and monitor the Strategy (see section 12 of the Sustainable Forest Development Act). The Strategy is designed to address the following six challenges:

- Forest management and development that take the interests, values and needs of the Québec population and the Aboriginal nations into account.
- Forest management practices that ensure ecosystem sustainability.
- A productive forest that generates wealth at different levels.
- Diversified, competitive and innovative wood products and forestry industries.
- Forests and a forest sector that help fight and adapt to climate change.
- A sustainable, structured and transparent form of forest management.

The vision, challenges and guidelines cover a 20-year period, while the objectives and actions are announced for a five-year period.

The tactical plan for integrated forest development is a major link in the chain of objectives set out in the Strategy. The plan was designed for use as part of a participatory, structured, transparent management approach involving the TLGIRT. In addition, the ecological issues it addresses ensure the application of an ecosystem-based development approach.

CHALLENGE 1: Take the interests, values, and needs of the Québec population and Aboriginal nations into account in managing the forests

Orientation 1: Maintain a dialogue with the public and the Aboriginal communities about forest management and development.

Objective 1 Identify the interests, values, needs, and expectations of the population (see section 5.2 about public consultation), including the Aboriginal communities (see section 5.3), with regard to forest management and development in Québec.

Orientation 2: Allow citizens, local communities, and Aboriginal communities to actively take part in regional forest management.

Objective 2 Improve participation by forest stakeholders in integrated forest management planning (see section 5.1 about TLGIRTs).

CHALLENGE 2: Use forest management practices that ensure ecosystem sustainability

Orientation 1: Manage forests in a manner to preserve the main features of natural forests.

Objective 1 Include local analysis of ecological issues in the integrated forest management plans and ensure suitable solutions are implemented (see section 7.2 about ecological issues).

Objective 2 Ensure that the age structure of managed forests resembles that of natural forests. (section 7.2.1)

Orientation 2: Maintain quality habitats for species requiring special attention and species sensitive to forest management activities.

Objective 1 Take into account the specific requirements of certain species when planning and carrying out integrated forest management activities (see section 7.2.6).

Objective 2 Ensure that forest management contributes to the recovery of woodland caribou populations (see section 8.1.4).

CHALLENGE 3: Ensure productive forests that create diversified wealth sources

Orientation 1: Increase the value created from wood to generate greater collective wealth (see section 8.4).

Objective 1 Develop a timber production strategy for Québec.

Objective 4 Dedicate certain portions of land to timber production (AIPL).

Orientation 2: Expand the range of products and services generated by the integrated development of forest resources and functions (see section 7.4).

Objective 1 Include activities that promote the development and protection of forest resources and functions in integrated forest management plans.

Objective 4 Ensure the maintenance of the visual quality of forest landscapes.

Objective 6 Encourage the development of non-timber forest products.

CHALLENGE 5: Ensure that forests and the forest sector help fight and adapt to climate change

Orientation 2: Consider forest carbon and the effects of climate change in forest management and development.

Objective 2 Determine and implement climate change adaptation measures in all spheres of forest management (see section 8.8).

4 Regional Planning

The regional plan is based on provincial, regional and local social, environmental and economic development issues. The regional guidelines arising from these issues are described in the integrated tactical forest management plan (tactical plan, often referred to by its French acronym PAFIT) and the public land use plan (often referred to by its French acronym PATP). Figure 1, at the end of this section, presents a diagram of the forest planning process.

The tactical plan is prepared in the region by the *Direction de la gestion des forêts du Nord-du-Québec* of the Ministère des Forêts de la Faune et des Parcs (MFFP). The public land use plan is prepared by the Ministère de l'Énergie et des Ressources naturelles (MERN).

Unlike the tactical plan, which covers a single management unit or group of management units, the public land use plan applies to the entire area within the regional administrative boundaries.

4.1 Tactical plan for integrated forest development (PAFIT)

Under the Sustainable Forest Development Act (SFDA), each management unit (MU) or group of management units must have a forestry plan that regulates forest management work in its forests. The planning process includes coordination at regional and local levels, followed by the preparation of an integrated tactical forest management plan (tactical plan, or PAFIT) by the Department. During the process, management issues and objectives are identifed, along with solutions to be included in the forest management strategy.

The tactical plan or PAFIT is therefore a strategic planning tool for forest resource development. It covers a period of five years and sets out the area's allowable cuts, sustainable forest management objectives, the forest management strategy chosen to ensure compliance with the allowable cuts and achievement of the objectives, and the locations of the main infrastructures and areas of increased timber production. The tactical plan also describes the main forest management guidelines on which the operational plan is based.

In addition, because the SFDA allows for connections between the various documents relating to the MFFP's strategic vision and their application in the field, the tactical plan is an important element that helps to give concrete form to the challenges identified in the Sustainable Forest Management Strategy. For example, the Strategy states that an analysis of the issues arising from the Government's objectives must be included in the tactical plan, along with solutions. The Act also provides that regional and local issues must be identified by local authorities such as the local integrated land and resource management panels.

4.2 Operational plan for integrated forest development (PAFIO)

The operational plan for integrated forest development mainly identifies the forest operations zones in which logging and other development activities (non-commercial silvicultural work and road work) have been proposed in the tactical plan. The operational plan is dynamic and is updated continuously to include new forest operations zones as they are prescribed and harmonized. The planner works with the Timber Marketing Board to identify the sectors in which wood will be sold on the open market.

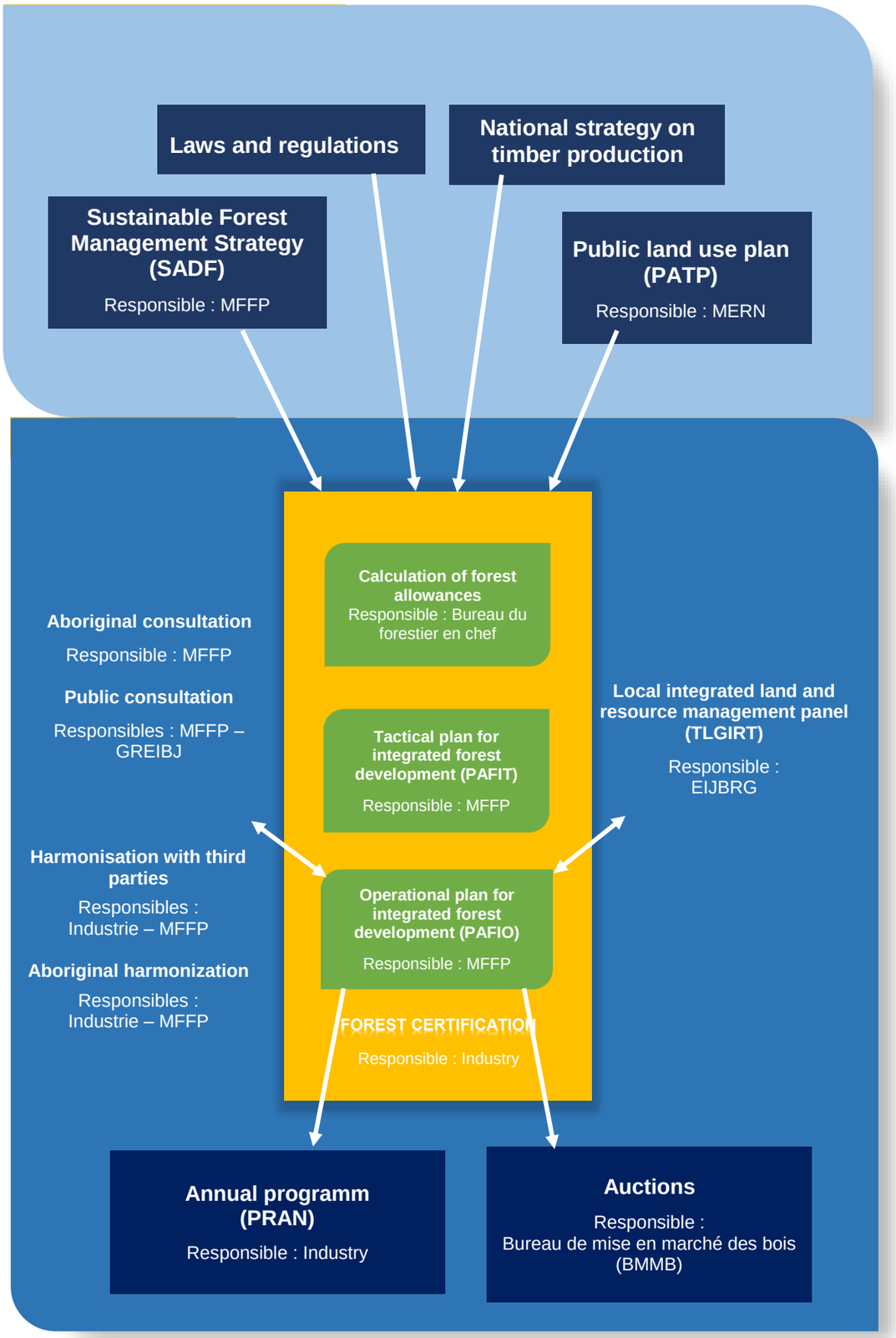
4.3 Annual program (PRAN)

For logging work, the holders of logging rights work with the MFFP to choose, from the operational plan, the forest operations zones in which logging will take place in the coming year. The annual program must allow for the anticipated volumes to be produced, and must comply with the forest development strategy set out in the tactical plan.

4.4 Public land use plan (PATP)

Public land use plans set out and convey the government's guidelines for the use and protection of public land. These guidelines are developed jointly by several departments and organizations, under the responsibility of the Ministère de l'Énergie et des Ressources naturelles (MERN).

The MFFP must take into account the government's public land use planning guidelines when managing public land. The planning process therefore includes a number of harmonization steps.



5 Participatory Management

5.1 Local integrated land and resource management panel (TLGIRT)

Created under Section 55 of the Sustainable Forest Development Act, the TLGIRTs play a coordinating role in the process of preparing the tactical and operational integrated forest management plans. This process brings together the individuals and organizations concerned by forest management within the territory, including the MFFP for all management units or groups of management units. Ongoing coordination makes it easier for the MFFP to take into account the interests and concerns of TLGIRT members, throughout the forest planning process. The success of the collaborative effort depends on the following elements: identification of the common interest, achievement of consensus, representativeness of community stakeholders, efficiency of methods and the need to achieve results. The MFFP has produced a guide (revised in 2018) to the creation and operation of the panels, which can be used by all the panels.

The TLGIRTs work contributes to the planning and implementing integrated forest management. They propose a set of issues and solutions in the form of recommendations. The ultimate decision as to which elements will be considered in the plans lies with the MFFP, in accordance with the Forest Planning Manual.

The Act provides that the MFFP may entrust a regional body with the task of setting up and overseeing the operations of a local integrated land and resource management panel. In the Nord-du-Québec region, this task has been entrusted to two regional bodies, namely the Eeyou Istchee James Bay Regional Government and the Cree Nation Government. The Sustainable Forest Management Program, for which the two regional bodies act as delegates, was designed to ensure the panels' operations and the achievement of specific projects.

As a result, in February 2016, Eeyou Istchee James Bay Regional Government (EIJBRG) set up nine TLGIRTs for Category III lands. These TLGIRTs are grouped by management unit. They are composed of the mandatory members, as listed in section 55 of the SFDA, plus other members including youth, seniors and women's groups. Meetings are held every three months, for a total of four each year (see Category III land panel distribution table).

In addition, in March 2017, the Cree Nation Government (CNG) set up the integrated resource management table (TGIR) for Category II lands. It is composed of representatives from the CNG and the Ministère des Forêts, de la Faune et des Parcs (MFFP), which are exclusive partners, as stated in section 66 of the Agreement on Governance in the Eeyou Istchee James Bay Territory between the Crees of Eeyou Istchee and the Gouvernement du Québec.

Map 3 : Repartition of local integrated land and resource management panels (TLGIRTs) by management unit

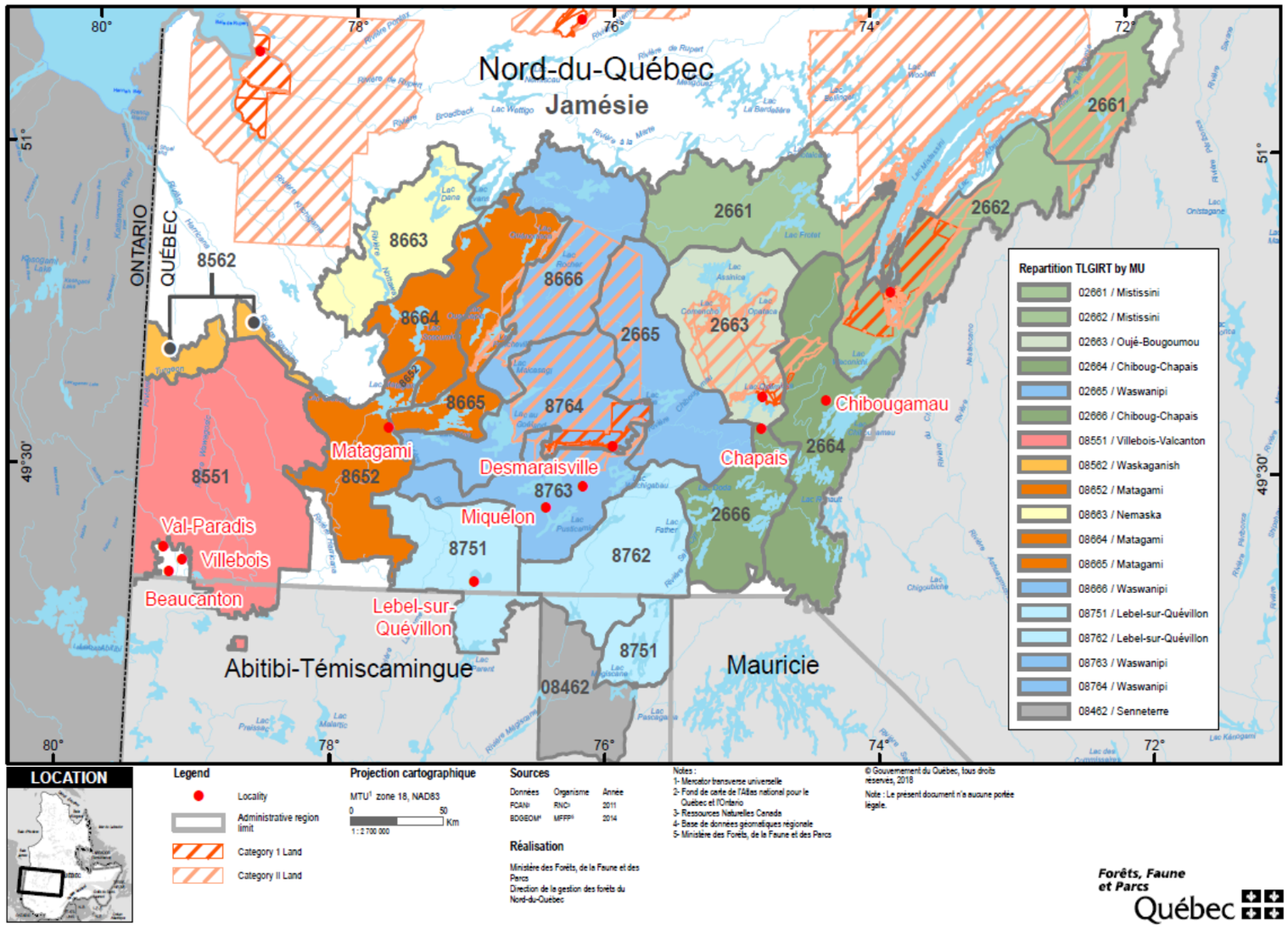


Table 4 : Local integrated land and resource management panels (TLGIRTs) distribution by management unit and total number of meeting held on February 28, 2018

Name of Category III land panel	Management unit	Total number of meeting held on February 28, 2018**
EIBJ – Villebois – Valcanton	**085-51***	10
EIBJ – Waskaganish	085-62	8
EIBJ – Lebel-sur-Quévillon	**087-51***, 087-62	7
EIBJ – Nemaska	086-63	6
EIBJ – Matagami	**086-52***, 086-64, 086-65	10
EIBJ – Chapais – Chibougamau	026-64, 026-66	11
EIBJ – Oujé-Bougoumou	026-63	9
EIBJ – Waswanipi	026-65, 086-66, 087-63, 087-64	9
EIBJ – Mistissini	026-61, 026-62	10
Name of Category II land panel	**Management unit**	**Total number of meeting held on February 28, 2018**
Integrated resource management table for Category II lands (Mistissini – Waswanipi – Oujé-Bougoumou)	026-61, 026-62, 026-63, 026-64, 026-65, 086-65, 086-66, 087-63 & 087-64 (Parts of MUs located on category II lands only)	2

*Management units for which the adapted forestry regime (Paix des Braves) does not apply.

**Information sourced from the Eeyou Istchee James Bay Regional Government website

For more details on the list of members of the TLGIRTs on Category III lands, consult the Eeyou Istchee James Bay Regional Government website at https://www.greibj-eijbrg.com/en/territory/tgirt

5.2 Public consultation

The Sustainable Forest Development Act (section 57) states that the integrated plans must be the object of a public consultation. The consultation process, its duration and the documents that must be attached to the plans for the consultation, are identified by the Minister in a published manual. (http://www.mffp.gouv.qc.ca/publications/forets/consultation/manuel-consul-plans.pdf)

The consultation process is divided into five phases:

1. preparing and announcing the conduct of public consultations;
2. communicating information on forest planning;
3. transmitting comments received;
4. drafting the consultation report;
5. taking comments into account for possible incorporation in the forest planning.

The objectives of public consultation on forest management plans are to:

- meeting the population's wish to be informed and listened to, and to see their interests, values and needs taken decisions in matters relating to forest development are made;
- fostering an increased understanding among the population of the management of the public forest, and more precisely, the planning of forest development, giving the members of the population the opportunity to express themselves on the proposed forest development plans and, where possible, incorporating the interests, values and needs voiced by the population in the plans;
- balancing the different interests of the many users of forest resources and land;
- harmonizing forest development with the population's values and needs;
- allowing the Minister to make the best decisions possible given the circumstance.

5.3 Aboriginal consultation

Consulting the Aboriginal communities is a non-delegated ministerial responsibility. The purpose of the consultation is to ensure that the values and needs of the Aboriginal communities are given more consideration in the forestry plans produced by the MFFP. It has to be kept in mind that the integrated forest management plans (PAFIs) for management units in the Nord-du-Québec region are produced within the legal context of the area covered by the James Bay and Northern Québec Agreement (JBNQA) and its various enacting statutes.

Consultations on management plans for nations that are not signatories to the JBNQA, namely the Algonquin and Atikamekw, are carried out in accordance with provincial guidelines, the Aboriginal communities' Consultation Manual for Integrated Forest Management Plans (https://mffp.gouv.qc.ca/wp-content/uploads/201709-27_DO.pdf) and the

Interim Guide for Consulting the Aboriginal Communities. (https://www.autochtones.gouv.qc.ca/publications_documentation/publications/guide_inter_2008.pdf).

Maintaining their right of trapping on the territory of the JBNQA, if it existed at the time of the signing of the Convention, results in a consultation of the forest management plans of the non-signatories. The consultation is divided into three phases: participation in the plan preparation process, the consultation itself, and feedback. Although part of a different process, public consultations and collaboration with TLGIRTs usually take place during the same period as the Aboriginal consultation process.

Based on the results of the consultations, the concerns, values and needs of the Aboriginal communities will be taken into consideration in sustainable forest development and forest management.

5.4 Changes to plans and subsequent consultation

A public consultation must also be held for changes or updates to the integrated plans (section 59 of the Sustainable Forest Development Act). Only the additions or changes themselves are submitted for public consultation. In the case of the operational plans, however, changes and updates are only submitted for consultation if they involve:

- the addition of a new potential forest operations zone or a new infrastructure;
- a substantial change i to a potential forest operations zone, infrastructure or forest development standard already set out in the plan.

Consultations are not required for special development plans and changes to them if the Minister considers that there is an urgent need for their application, and particularly if the plan is considered necessary to avoid a deterioration or loss of timber (section 61 of the Sustainable Forest Development Act.)

By "substantial change", the MFFP essentially means a modification of the outer contour of a given forest operations zone whereby the size of the zone in question is larger than that submitted to public consultation; a given infrastructure relocated outside the corridor submitted to public consultation; or a change in forest development standard whereby forest development operations are more intensive than initially planned and submitted to public consultation (e.g.: cut with soil and regeneration protection vs. partial cut). The Minister jointly with the TLGIRTs may clarify this definition to provide a better framework for situations requiring the conduct of another public consultation.

PART 2: DESCRIPTION OF THE AREA COVERED BY A TACTICAL PLAN

6 Background and description of land, resources and use

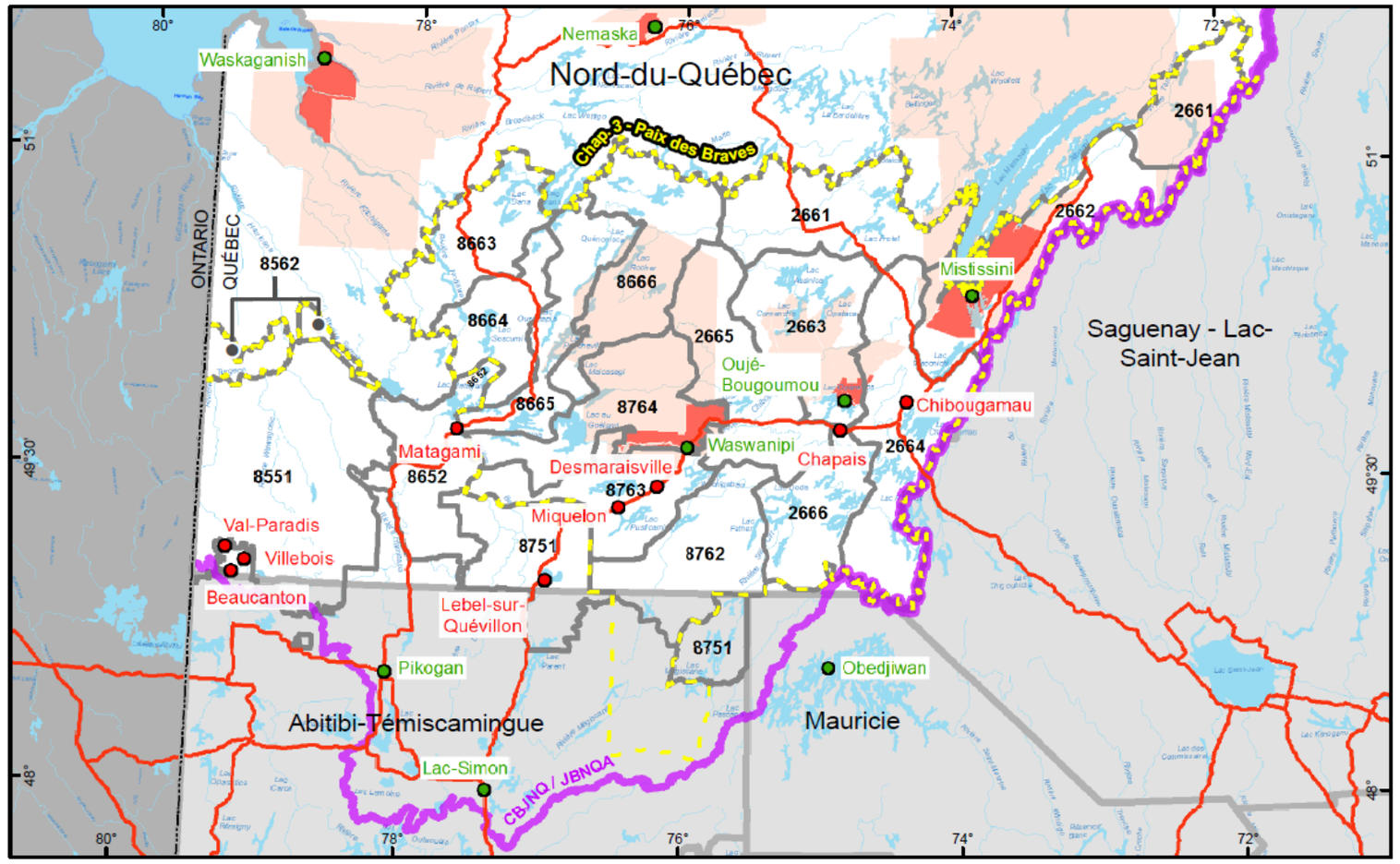
6.1 Location of the management unit (MU)

Management unit (MU) 086-52 falls under the unité de gestion de l'Harricana-Nord local office (MU 106). Its total surface area is 3,891 km². This MU lies within the Eeyou Istchee James Bay territory in Nord-du-Québec. It includes the municipality of Matagami.The most important bodies of water in this MU are Lac Matagami and Rivière Allard. It is crossed by Route 109.

A map showing the locations of MUs 086-52 can be found in Appendix A.

The following map and table illustrate the localities for the MUs in the Nord-du-Québec region.

Map 4 : Localities, aboriginal communities and category II land in Nord-du-Québec



Localité / Locality
Communautés autochtones / Native community
Lim. Rég. Admin
Chap. 3 - Paix des Braves
CBJNQ / JBNQA
Route / Road
Terres de catégorie I / Cat. I Land
Terres de catégorie II / Cat. II Land

Projection cartographique

MTU[1] zone 18, NAD83

0 50 Km

1 : 2 700 000

Sources

Données	Organisme	Année
FCAN[2]	RNCI	2011
BDGEOM[4]	MFFP[5]	2014

Réalisation

Ministère des Forêts, de la Faune et des Parcs
Direction de la gestion des forêts du Nord-du-Québec

Notes :
1- Mercator transverse universelle
2- Fond de carte de l'Atlas national pour le Québec et l'Ontario
3- Ressources Naturelles Canada
4- Base de données geomatiques régionale
5- Ministère des Forêts, de la Faune et des Parcs

Forêts, Faune et Parcs
Québec

Table 5 : Localities and category II lands for the MUs in the Nord-du-Québec region

MU	Locality	Presence of category II land
026-61		Linked to Mistissini
026-62	Mistissini	Linked to Mistissini
026-63	Oujé-Bougoumou	Linked to Oujé-Bougoumou
026-64	Chibougamau	Linked to Mistissini and Oujé-Bougoumou
026-65		Linked to Waswanipi
026-66	Chapais	
085-51	Villebois Valcanton are located outside the MU	Outside chapter III of thePaix des Braves
085-62		
086-52	Matagami	Outside chapter III of thePaix des Braves
086-63		
086-64		
086-65		Linked to Waswanipi
086-66		Linked to Waswanipi
087-51	Lebel-sur-Quévillon	Outside chapter III of thePaix des Braves
087-62		
087-63	Desmaraiville, Miquelon, Waswanipi	Linked to Waswanipi
087-64		Linked to Waswanipi

6.2 Management unit mergers

New management unit boundaries came into force in six regions of Québec on April 1, 2018. No MU boundaries were changed for the Nord-du-Québec region. For more information about the merging of other MUs in Québec, see: http://mffp.gouv.qc.ca/forets/amenagement/documents/carte-UA-2018-2023.pdf for offical maps.

6.3 Management unit areas that are protected or covered by special provisions

Because the tactical plan must consider issues such as the age structure of the forest and deployment of the main road network, it may be necessary to consider portions of the area in which forest management activities are not permitted, and also adjacent land including protected areas, biological refuges, public land used for purposes other than timber production, steep slopes, privately-owned land and so on.

The following table lists the management modes present on each MU. The management mode is a territorial subdivision. Theses areas include productive and unproductive forest areas and water. Some territories are included, others are excluded from the Annual Allowable Cut (AAC or Possibilité forestière in French).

Table 6 : Management Modes for MU 086-52

Code	Management mode	ICP*	Area (ha)
			MU 086-52
01	Management unit (MU)	Yes	357 795
52	Water (major lakes, large rivers, reservoirs)		19 753
53	Aquatic reserve and/or floristics species habitat threatened or vulnerable		510
90	Indian reserve and category 1A land		0
26	Category 1B land		0
41	Other MFFP land (forest (public nurseries), wildlife and parks (Niibiishi Corporation)		0
09	Blueberry farm in a management unit (MU)	Yes	0
15	Exceptional forest ecosystem designated in a public forest		0
66	Experimental forest		3
58	Project for an experimental forest and biological refuge		0
06	Experimental forest in a management unit (MU)		0
40	Québec national park or park project		0
59	Designated biological refuge		2 458
55	Project for a biological refuge (protected from logging)		4 220
54	Biodiversity reserve		3 801
13	Residual forest (Territoire forestier résiduel, or TFR) under a management delegation agreement (entente de délégation (ED)	Yes	0
02	Residual forest (Territoire forestier résiduel, or TFR) with no rights granted south of the northern limit		1 768
27	Public mining concession		0
68	Public mining concession in a residual forest (territoire forestier résiduel, or TFR)		0
28	Public mining concession in a management unit (MU)	Yes	712
20	Small private property		445
22	Large private property		0
71	Mixed lot		9
51	Land allocated to the MDDELCC		0
60	Land allocated to other government departments or bodies (Hydro, MTQ, MCC, etc.)		12
	Total		**391 486**

Several elements of biodiversity are taken into account in the Tactical Integrated Forest Management Plan via legal or administrative protections, specific terms and the northern boundary.

6.3.1. Legal protection

The government provides legal protection for a portion of the territory by excluding it from any form of forest operation or development. The *National Heritage Conservation Act* requires that a register of protected areas be kept, the Registre des aires protégées. Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC) distributes the information in the register and keeps it up to date.

In addition to the areas listed in the Québec register, Ministère des Forêts, de la Faune et des Parcs (MFFP) also uses regulations to protect certain lands via the SFDA. These include certain biological refuges that have not been designated as protected areas, exceptional forest ecosystems (EFE), teaching and research forests, forest reserves, and other types of land use incompatible with forest development.

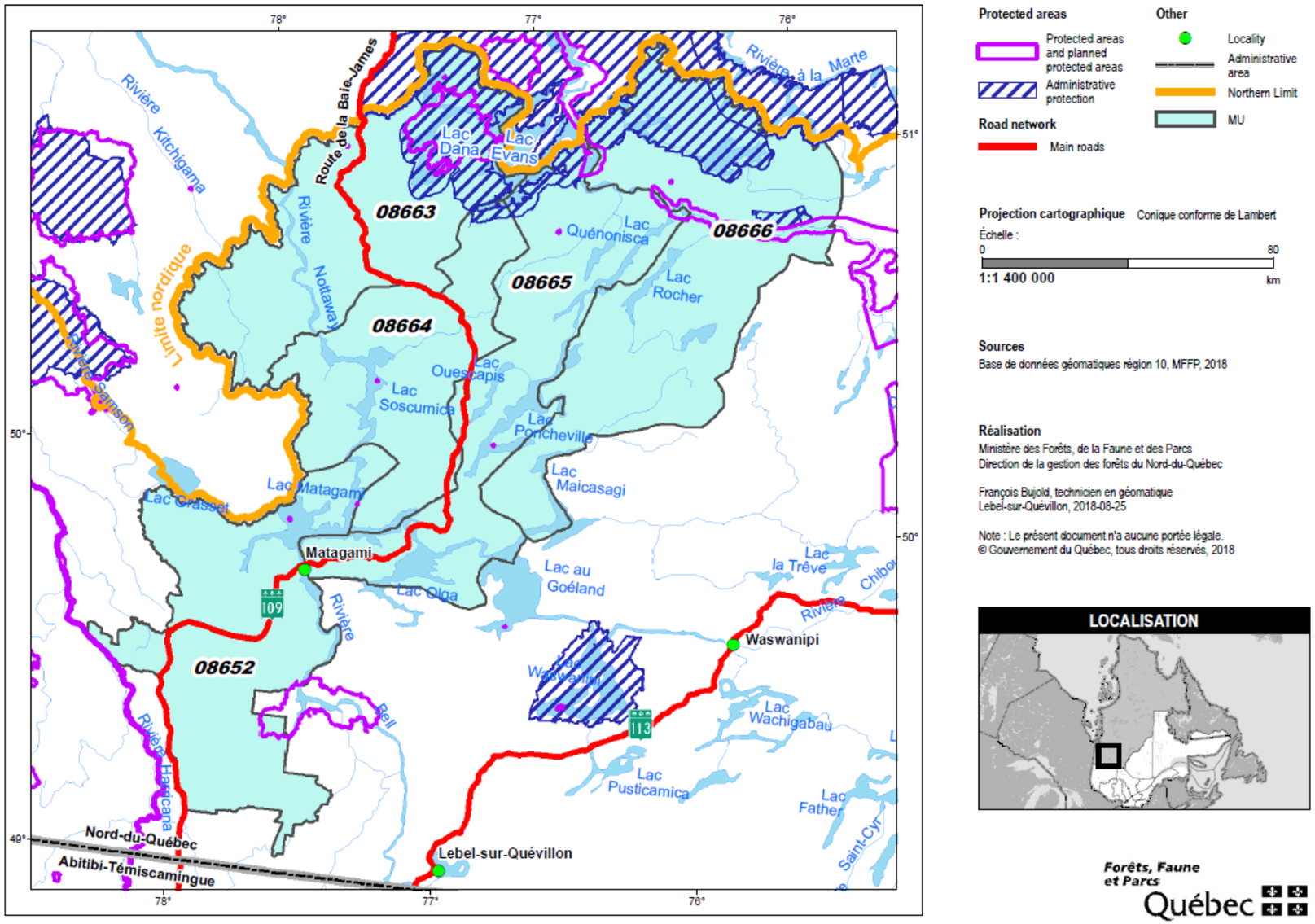
Also in compliance with the SFDA, to ensure that forest management practices rigorously respect all recognized sustainable development criteria, MFFP establishes a boundary beneath which the forests may be sustainably developed. This boundary is commonly called the northern limit for timber allocations. The boundary was reviewed and the resulting changes went into effect on April 1, 2018. However, there has been no change to the northern limit for the Nord-du-Québec region.

MFFP also issues tools and information on the operations allowed on all public territory. The Sustainable Forest Management Rules (RADF) apply to the entire territory and support the strategy for conserving and protecting the forest. The English version of the RADF guide is available on : https://mffp.gouv.qc.ca/RADF/guide/?lang=en.

6.3.2. Administrative protection

As part of the protected area designation process, zones that have not yet been legally designated but have passed all the steps necessary to have their final boundaries drawn and undergo the MDDELCC administrative protection process are removed from the allowable cuts and forestry planning. In this way MFFP protects territories put forth by MDDELCC and agreed upon by the concerned ministries after an in-depth analysis of all related issues.

Map 5 : Location of the northern limit and territories protected by large protected areas



Protected areas

- Protected areas and planned protected areas
- Administrative protection

Road network

- Main roads

Other

- Locality
- Administrative area
- Northern Limit
- MU

Projection cartographique Conique conforme de Lambert

Échelle :

0 — 80 km

1:1 400 000

Sources

Base de données géomatiques région 10, MFFP, 2018

Réalisation

Ministère des Forêts, de la Faune et des Parcs
Direction de la gestion des forêts du Nord-du-Québec

François Bujold, technicien en géomatique
Lebel-sur-Quévillon, 2018-08-25

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

LOCALISATION

Forêts, Faune et Parcs
Québec

6.3.3. Special provisions for 086-52, 087-51

In addition to the legal, regulatory, and administrative protections, a portion of the territory is subject to certain measures that lead to temporary suspension of forestry activities. This is the case for the core forest areas identified for ecosystem-based management.

6.4 History of the territory

6.4.1. Territorial reference unit (UTR) overview

A territorial reference unit (UTR) is defined as a management unit or other section of forest land in the domain of the State or a subsection of such land, all in one piece, with a surface area of less than 100 km² in the bioclimatic domains of the maple, less than 300 km² in the bioclimatic domains of the pine, and less than 500 km² in the bioclimatic domain of the spruce-moss. These territorial reference units are stable over time. Section 131 of the Sustainable Forest Development Rules (RADF) states that in UTRs where trees are harvested, at least 30% of the productive forest area of stands 7 m or more in height must be maintained at all times.

The UTR limits for management units 085-51, 086-52 and 087-51 are based on the spatial organization compartments (COS) boundaries which are determined by the forest managers of each Unité de gestion.

The following table shows the percentage of productive forest area for each UTR covered in stands that are more than 7 m tall. This data reveals that the proportion of forests 7 m or more in height stays over 30% in all UTRs. The percentage of stands measuring 7 m or taller ranges from 46.8% to 90.2%. The following map shows the location of UTRs in the MU.

Table 7 : Territorial reference units (UTR) for the MU 086-52

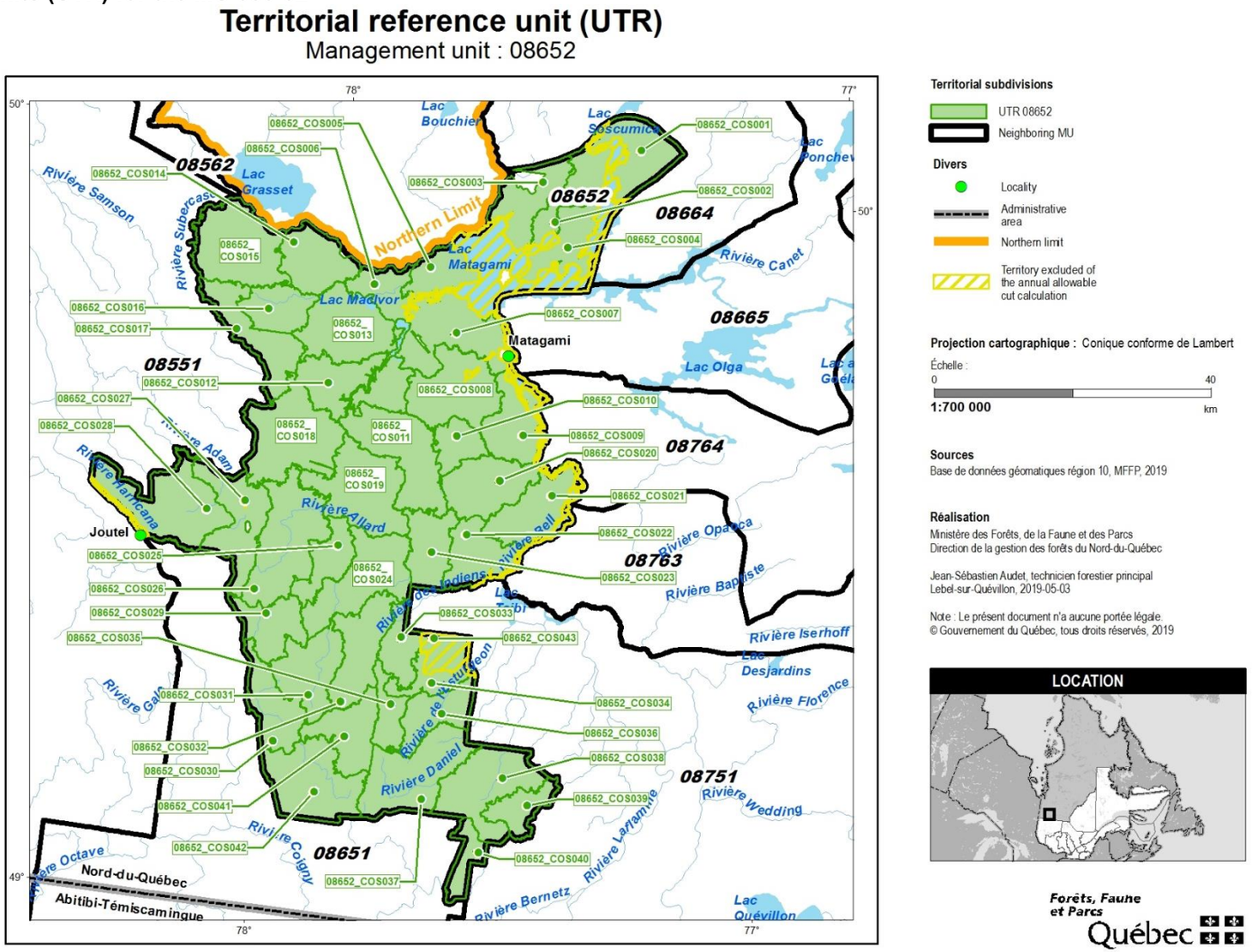
UA_UTR	Productive forest area included	Productive forest area of 7 m +	% of 7 m +
08652_COS001	6202	2610	42,1%
08652_COS002	5737	2035	35,5%
08652_COS003	4557	3709	81,4%
08652_COS004	5877	3861	65,7%
08652_COS005	3123	2466	79,0%
08652_COS006	3054	1721	56,4%
08652_COS007	9133	6921	75,8%
08652_COS008	8872	5370	60,5%
08652_COS009	5743	4545	79,1%
08652_COS010	3616	2125	58,8%
08652_COS011	7496	5662	75,5%
08652_COS012	8275	2947	35,6%
08652_COS013	9050	3423	37,8%
08652_COS014	3404	2569	75,5%
08652_COS015	5994	3930	65,6%
08652_COS016	2575	1967	76,4%
08652_COS017	4359	2026	46,5%
08652_COS018	8248	7067	85,7%
08652_COS019	8716	3546	40,7%
08652_COS020	8383	3425	40,9%
08652_COS021	6750	2800	41,5%
08652_COS022	5075	1833	36,1%
08652_COS023	5387	2939	54,6%
08652_COS024	9693	4099	42,3%
08652_COS025	4197	1211	28,9%
08652_COS026	10915	6218	57,0%
08652_COS027	5525	4085	73,9%
08652_COS028	9457	4027	42,6%
08652_COS029	4637	2350	50,7%
08652_COS030	6409	4796	74,8%
08652_COS031	7434	5308	71,4%
08652_COS032	7399	2480	33,5%
08652_COS033	3376	2256	66,8%
08652_COS034	2638	767	29,1%
08652_COS035	3320	982	29,6%
08652_COS036	5784	2296	39,7%
08652_COS037	11688	8306	71,1%
08652_COS038	10804	7109	65,8%
08652_COS039	3905	1456	37,3%
08652_COS040	2935	2027	69,0%
08652_COS041	5975	1866	31,2%
08652_COS042	10843	8073	74,5%

The Territorial Reference Units (UTR) are the spatial organization compartments (COS) boundaries which are determined by the forest manager of management unit 086-52.

Management modes selected are the same as the ones used inside the Paix des braves.

Data comes from "fichier intrant" up to date on April 1, 2018 (cutover 2015 et PAFIO 2016-17 200%)

Map 6: Territorial reference units (UTR) for the MU 086-52



6.4.2. Nord-du-Québec Historical use of the land

The Québec-Labrador peninsula was colonized after the last ice age, which ended 10,000 years ago. Waves of migration came from the Great Lakes, the Labrador coast, and Rivière Saguenay between 5,300 and 5,000 years ago. These were nomadic hunting peoples.

The fur trade began in this territory around 1670. European colonists, including Pierre-Esprit Radisson and Médard Chouart des Groseilliers, were active participants in exploring the lands and establishing the Hudson's Bay Company. In the early 18th century the fur trade was booming, with numerous trading posts across the region. The colonists traded with the "Indians" they encountered there, primarily the Crees.

"In the late 19th century, the primary commercial activity remained fur trading. But this was about to change. A shift began withscientific reports of the wealth of potential mineral, forest, and hydroelectric resources in Baie James." (p.111)

Chibougamau was founded in 1954, the first town built in the region to capitalize on its mineral resources, especially copper. The northern forestry industry began to develop over the ensuing years. The mining village of Chapais was formed at about the same time, with the opening of the Opemiska Copper Mine. It was not until the 1970s that a sawmill and processing plant were built and Chapais, later Barrette-Chapais, began to diversify its economy. "Matagami [founded in 1963] [also] owed its existence and most of its growth to the mining industry" (p. 168), in contrast to Lebel-sur-Quévillon, which was literally built from forestry camps. The town and the surrounding area also experienced their own successive waves of mineral prospectors.

Located completely west of the territory of Nord-du-Québec and located almost exactly on the 49th parallel, the localities of Val-Paradis and Beaucanton (now merged and named Valcanton) and the locality of Villebois are born around 1935. They are populated by the arrival of new settlers attracted by forest lands and the hope of developing agriculture there.

Source: http://www.histoireforestiereat.com

The Aboriginal peoples living on the land continued their hunting, fishing, and trapping activities throughout this development, though they had to adapt to the growing presence of foreigners. The Algonquin communities of Pikogan (Abitibiwinni) and of Lac Simon were respectively created in 1958 and 1962. The Atikamekw community of Opitciwan was created in 1944. The Cree communities of Mistissini, Waswanipi, Nemaska, and Waskaganish were created in the 1970s and 80s after the signing of the JBNQA, although certain occupations date back to the trading post era. Oujé-Bougoumou was created in 1995 after many years of wandering and fighting for recognition of their band.

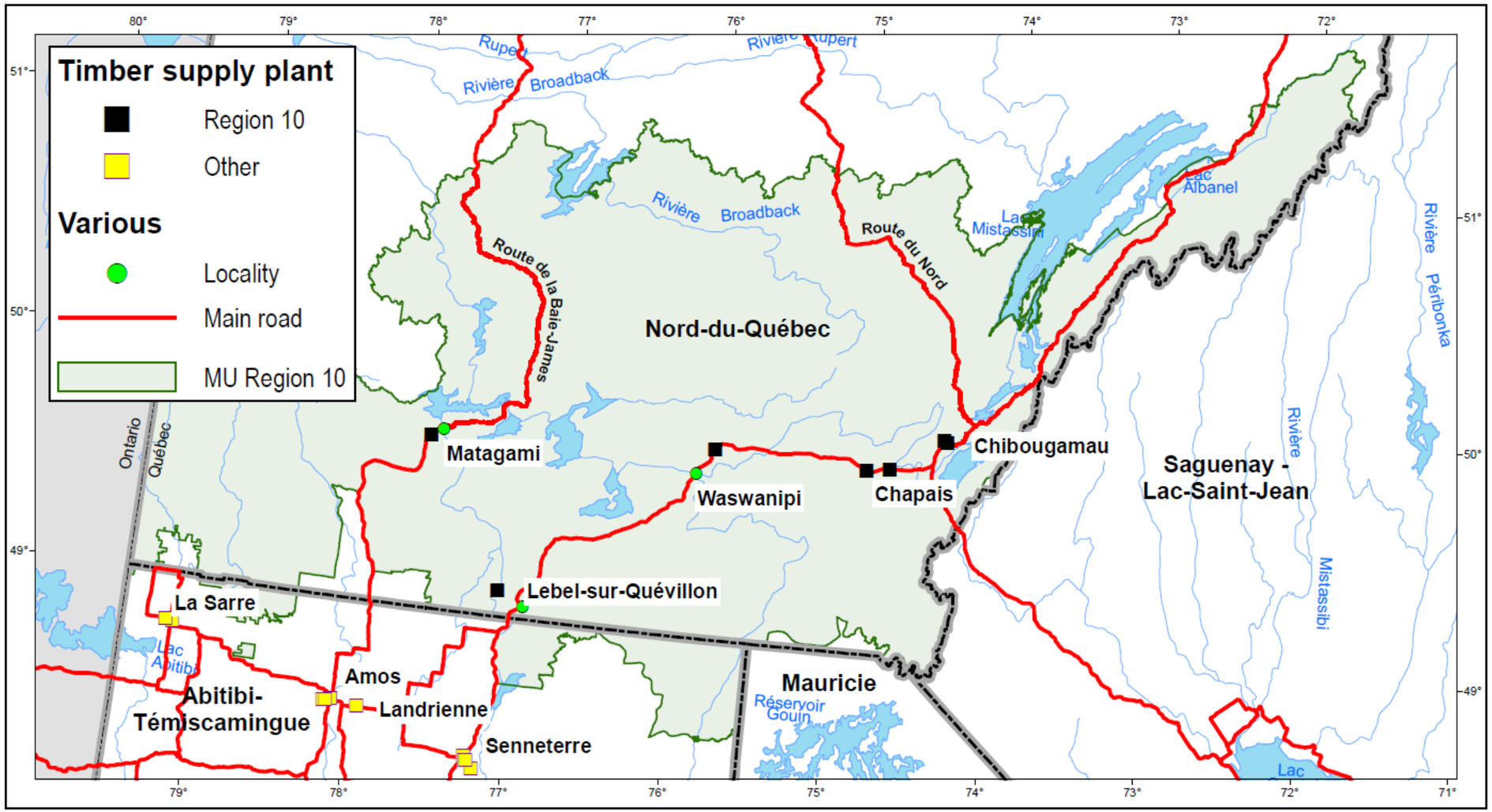
Source:
Huot, F. and J. Désy (2009). *La Baie James des uns et des autres « Eeyou Ischtee »*, Les Productions FH, Québec, 303 pp.
Website : Site web : https://www.rncan.gc.ca/sciences-terre/geomatique/arpentage-terres-canada/publications/11099 consulted on Feb. 26, 2019

6.5 Socio-economic context

The Nord-du-Québec administrative region was created in 1987. At 718,229 km^2 it is the province's largest region, and its economy is structured around its natural resources, from mining to hydroelectricity to forests. The region's 17 management units lie south of the northern limit for timber allocations. They cover a total of 83,234 km^2.

The portion of the region designated for forestry activities begins at the 49th parallel and stops around the 51st parallel, at the northern limit for timber allocations. It includes the territory of the 17 MUs. A number of products are produced from the boreal forest in Nord-du-Québec. The region is home to six lumber mills, while other lumber mills and pulp plants outside the region also get materials from Nord-du-Québec. The region's biomass potential estimated by Direction de la gestion des stocks ligneux (DGSL) for 2018-2023 is nearly 535,000 green metric tons/year. (Data available on September 14, 2018.) Private individuals can also harvest firewood from forests in the domain of the State provided they have a permit.

Map 7 : Location map for timber supply plants in Nord-du-Québec



Donnée en date du : 4 janvier 2018
Source : Base de données géomatiques de la région 10

Table 8 : Forestry rights in Nord-du-Québec and associated plants

Forestry Rights	Timber Supply Guarantee Holder	Plant √	Locality	Region	TA	Activity	Species	Nord-du-Québec TSG Volume (m^3)	Supplying MU
PRAU	MRC Abitibi-Ouest (CtAF)		La Sarre	08	431	Harvesting	SEPM	41 000	8551
PRAU	Municipalité de Taschereau (CtAF)		Taschereau	08	432	Harvesting	SEPM	3 800	8551
PRAU	Corporation foncière de Waswanipi (CtAF)		Waswanipi	10	409	Harvesting	SEPM	155 000	2663, 2665, 8764
PRAU	Corporation forestière Eenatuk (CtAF)		Mistissini	10	414	Harvesting	SEPM	125 000	2661, 2662
GA	Produits forestiers Résolu (Senneterre)	√	Senneterre	08	034	Lumber	SEPM	115 550	8751, 8763
GA	RYAM (La Sarre)	√	La Sarre	08	036	Lumber	SEPM	344 050	8551, 8562, 8652, 8663, 8664, 8665, 8666
GA	Eacom Timber Corporation	√	Matagami	10	041	Lumber	SEPM	307 300	8652, 8663, 8664, 8665, 8666, 8751, 8763, 8764
GA	Scierie Landrienne inc.	√	Landrienne	08	042	Lumber	SEPM	133 400	8652, 8663, 8664, 8665, 8666
GA	Matériaux Blanchet inc.	√	Amos	08	046	Lumber	SEPM	135 900	8652, 8663, 8664, 8665, 8666
GA	Produits forestiers Résolu (Comtois)	√	Lebel-sur-Quévillon	10	048	Lumber	SEPM	413 600	8652, 8663, 8664, 8665, 8666, 8751, 8762, 8764
GA	Barrette-Chapais ltée	√	Chapais	10	215	Lumber	SEPM	455 500	2661, 2663, 2664, 2665, 2666, 8751, 8762, 8764
GA	Les Chantiers de Chibougamau ltée	√	Chibougamau	10	217	Lumber	SEPM	310 900	2661, 2662, 2663, 2664, 2665
GA	Produits forestiers Nabakatuk 2008, s.e.n.c.	√	Waswanipi	10	345	Lumber	SEPM	70 000	2665, 8763, 8764
GA	Norbord La Sarre (OSB)	√	La Sarre	08	053	Oriented strand board	Paper birch	4 850	8551, 8652 086-64, 086-65, 087-51
							Poplars	154 200	
GA	Forex-Amos inc. (LVL)	√	Amos	08	402	Laminated veneer lumber	Poplars	35 200	8551, 8652, 8751
GA	Forex-Amos inc. (OSB)	√	Amos	08	442	Oriented strand board	Poplars	28 500	8751, 8763
							Paper birch	36 000	8652, 8751
GA	Les Entreprises Alain Maltais inc.	√	Chibougamau	10	354	Lumber	Hardwoods	200	
							Poplars	200	2662, 2663, 2664, 2665

Notes: PRAUs are associated with holders of permits to harvest timber to supply a wood processing plant in Nord-du-Québec and correspond to forest management contracts (CtAF). The official DGSL table will be available in April after the timber supply guarantee offers are signed by the BGAs. The supply by MU is for information purposes only as supply volumes are distributed by integration zone (ZI).

Data source: DGSL, timber supply guarantee offers October 2017

Table 9 : Biomass harvesting permit holders in Nord-du-Québec

Forest Biomass Allocation Agreement (EABF/PRAU)	Locality	Region	TA	Management unit	Amount (GMT)[1] Nord-du-Québec
BoreA	Boisbriand (Chapais)	Laurentides 06 (Chapais)		026-62	500
				026-63	1 000
				026-64	1 500
				026-65	500
				026-66	500
				Total	**4 000**
Norforce Énergie inc.	La Sarre	Abitibi-Témiscamingue 08		085-51	2 500
				Total	**2 500**
Huiles essentielles NORDIC	Chibougamau	Nord-du-Québec 10		026-62	500
				026-63	500
				026-64	3 000
				026-65	1 000
				Total	**5 000**
Chapais Énergie, Société en commandite	Chapais	Nord-du-Québec 10	630	026-61	16 800
				026-62	3 500
				026-63	11 300
				026-64	15 900
				026-65	20 000
				026-66	7 500
				Total	**75 000**

[1]. Biomass is measured in mass rather than volume; GMT: green metric ton.

Data as of: October 20, 2017 Source: DGSL Draft 18-23

6.6 Description and recreational use of the area

The managed forest in Nord-du-Québec offers a wealth of recreational, visual, and cultural uses. It includes controlled wildlife territories (two wildlife reserves and three outfitting operations with exclusive rights), 81 outfitters without exclusive rights, and leased lands with exclusive trapping rights. The forest also contains 1,286 rough shelters, illustrating the importance of wildlife harvesting activities in the region. There are also 840 recreational leases[5], the majority of which are located south of the 50th parallel. Private recreational properties have sprung up around some forty lakes, whose popularity varies according to their accessibility and proximity to area communities. Matagami, Chibougamau, Quévillon, Opémisca, Turgeon, Caché, aux Dorés, Buckell, Royer, David, Olga, and Madeleine are the main lakes.

Public lands also support a major network of infrastructure and trails that enables locals to enjoy their favorite activities. There are over 4,100 km of canoe/kayak routes[6] used by various sports companies and associations on some 40 rivers, including the Rupert, Eastmain, Harricana, Bell, and de la Baleine. The area includes over 2,090 km of managed and informal snowmobile trails between the sectors of Villebois and Mistissini. They are maintained by various snowmobile clubs in Matagami, Lebel-sur-Quévillon, Chapais, and Chibougamau[6]. Approximately 1,230 km of ATV trails have been created in Chapais-Chibougamau and Villebois-Valcanton and are maintained by local ATV clubs. Motorized sports enthusiasts use thousands more kilometers of forest roads and unmarked trails to get around and enjoy all the forest has to offer.

[5] Ministère des Ressources naturelles et de la Faune. Direction de l'énergie, des mines et du territoire public, Internal compilation, December 2007.

[6] Ministère de l'Énergie et des Ressources naturelles. Direction régionale Nord-du-Québec, IGT compilation interne, Mai 2015.

A variety of other sorts of trails also criss-cross the forest: some 60 km of registered dogsled trails, more than 160 km of hiking and bike trails, 110 km of snowshoe and cross-country ski trails and some 20 km of equestrian trails.

Source:

http://www.decrochezcommejamais.com/fichiersUpload/fichiers/20180404144534-bj-2018-gto-fra-low-res.pdf, accessed on June 13, 2018

Ministère de l'Énergie et des Ressources naturelles. Direction régionale Nord-du-Québec, IGT compilation interne, June, 2020.

More outdoor tourism offerings are springing up with activities from Centre de plein air du Mont Chalco, Tourisme Baie-James and Tourisme Eeyou-Istchee, and adventure tourism businesses offering nature expeditions in cooperation with the Cree communities. The managed forest in Nord-du-Québec also encompasses archeological sectors and sites that present a record of the ancient practices of Aboriginal communities.

6.7 Biophysical profile (resources vs. precarious statuses)

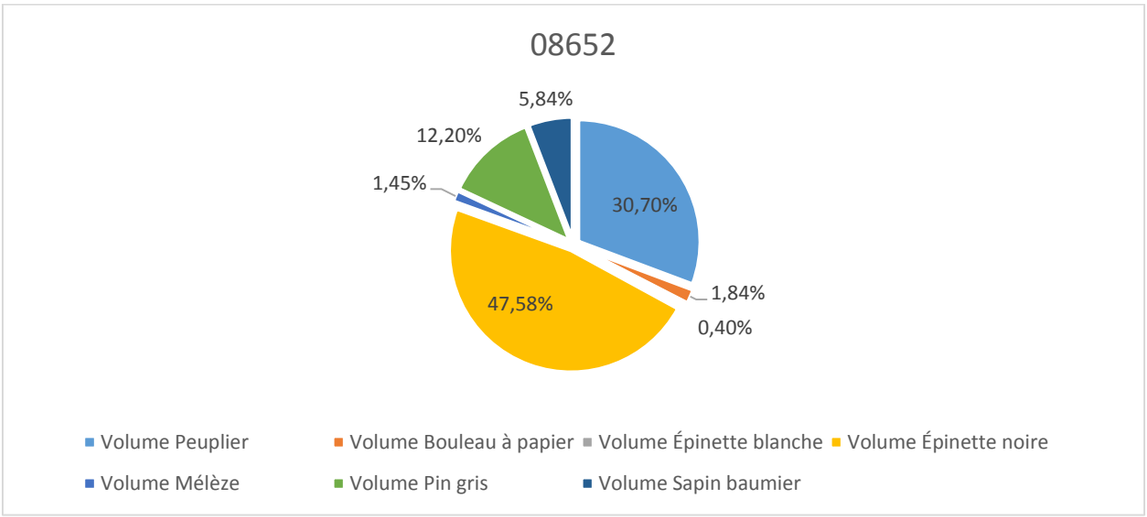
6.7.1. Timber resources

The following data and figures paint a picture of the resources in MU 086-52.

Breakdown of commercial volume by forest species

The breakdown of commercial volume by forest species is an approximation based on data from the master file used for the operational characterization of the territory. This file is created from the map of the original ecoforest stands in the 4th ten-year inventory. The inventory was last updated on March 31, 2017. The updates were made based on annual reports up to 2014, progress reports on timber harvesting in 2015, and annual planning for 2016 representing about two years of harvest.

Figure 1 : Breakdown of commercial volume by tree species for MU 086-52

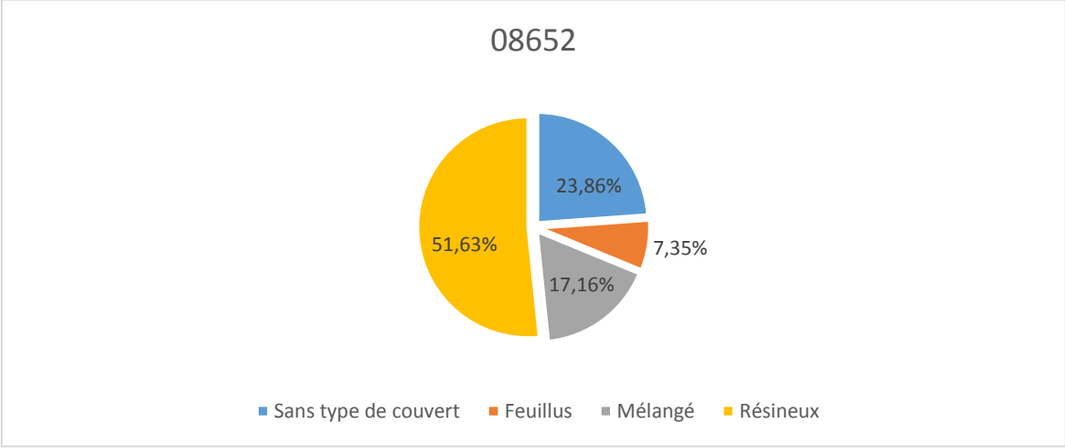


	Poplar	Birch	White spruce	Black spruce	Larch	Jack pine	Fir
Volume	4 630 779	277 897	60 423	7 176 138	217 971	1 839 422	880 487
%	30,70	1,84	0,40	47,58	1,45	12,20	5,84

Breakdown of productive areas by type of forest cover

The data used for this table comes from the operational characterization file. This is the file made from the original map of ecoforest stands updated to 2014 based on technical and financial activity reports, 2015 with the cuts over, and 2016 and 2017 based on the PAFIO with 200% of 2016-17. Are included in category ''No type of cover'' the area of productive forest stands with a height of less than 2 meters (heigh classes of 6 and 7) for which it was not possible to determine the composition

Figure 2 : Breakdown of productive areas by type of forest cover for MU 086-52



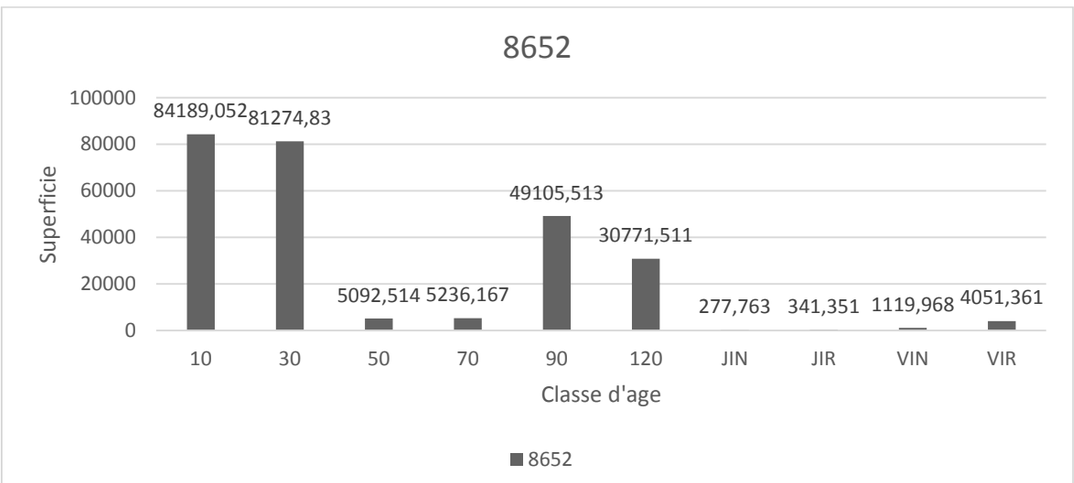
	No type of cover	Hardwood	Mixwood	Softwood
Ha	62 394	19 209	44 878	134 980
%	23,86	7,35	17,16	51,63

Breakdown of productive areas by age group

The numbers in this table are an approximation based on data from the master file used for the operational characterization of the territory. This file is created from the map of the original ecoforest stands in the 4th ten-year inventory. The inventory was last updated on March 31, 2017. The updates were made based on annual reports up to 2014, progress reports on timber harvesting in 2015, and annual planning for 2016 representing about two years of harvest.

About the codes used, age classes 10 to 120 are used for even-aged forests. An even-aged forest is a forest where the stand is composed of trees of the same age. In the opposite side, an uneven-aged forest is a forest with several age classes and sizes. The codes JIN, JIR, VIN, VIR refer to unequal settlement structures. "J'' indicates that the dominant stems are considered ''young'' with a maximum age of 80 years. "V" indicates that the dominant stems are old when they are over 80 years old.

Figure 3 : Breakdown of productive areas by age group for MU 086-52



Age Group	10	30	50	70	90	120	JIN	JIR	VIN	VIR
Area	84 189	81 275	5 093	5 236	49 106	30 772	278	341	1 120	4 051
Pourcentage										
%	32,20	31,08	1,95	2,00	18,78	11,77	0,11	0,13	0,43	1,55

6.7.2. Non-timber resources

For inhabitants of the boreal forest whose diet was primarily meat-based, plants provided important nutrients, vitamins such as vitamins A and C, minerals such as calcium, and fiber. Over time plant use has evolved. But today people still gather berries such as blueberries, raspberries, cloudberries, and cranberries, as well as certain barks and plants needed to prepare beverages and aromatic products. There is a thriving industry of non-timber forest products in Nord-du-Québec. Some of the fruits and herbs from the region's boreal forest identified for sale to consumers include wild currants, creeping snowberry, Labrador tea, fireweed, sweet gale seeds (myrica gale), dune pepper (mountain alder), cloudberry, and spruce tips. Mushrooms are another marketable product in Nord-du-Québec, including morels, matsutakes, and lobster mushrooms.

Source: https://www.faunenord.org/fr/boutique/tisane-flore-boreale/ accessed on June 19, 2018

6.7.3. Plant species at risk

Nineteen plant species in Nord-du-Québec deemed at risk for survival have been placed or are likely to be placed on the list of threatened or vulnerable plants, under the Loi sur les espèces menaces ou vulnérables in Québec. Forest planning must take these plants and their habitats into consideration. A list of these species can be found in Appendix B. Eight of them are of particular concern to us because of the threat forest development activities pose to them and their rarity across the province (see Table 10).

Table 10 : Plant species of interest, at-risk for Nord-du-Québec

Species	Habitat
Calypso bulbosa var. americana Calypso	*Cedar stands, cedar-larch stands, fir stands with white spruce or white birch; calcareous environments.*
Corallorhiza striata var. striata *Striped coralroot*	*Coniferous or mixed forests and spagnum moss/cedar stands, poplar stands; calcareous environments.*
Drosera linearis *Slender-leaved sundew*	*Open, very wet peaty environments; boggy areas by lakes.*
Gratiola aurea *Golden hedge-hyssop*	*Sandy or silty shorelines, in several centimeters of water or out of the water.*
Hudsonia tomentosa *Wooly beach heather*	*Clearings of jack pine stands on sand dunes or terraces, maritime dunes and barrens, sandy shores.*
Erythranthe geyeri *Geyer's yellow monkeyflower*	*Sandy or gravelly shores of cold springs, eskers, or moraines, open environments.*
Galearis rotundifolia *Small round-leaved orchid*	*Cedar stands, cedar-larch stands, mineral-rich peat bogs; calcareous environments.*
Utricularia geminiscapa *Twin-stemmed bladderwort*	*Raised bogs and quiet, stagnant waters of ponds and lakes.*

6.7.4. Wildlife resources

There are few controlled territories in Nord-du-Québec with specific wildlife management provisions. However, the two provincial wildlife reserves located in the region cover a considerable area. The Lacs-Albanel-Mistassini-et-Waconichi and Assinica wildlife reserves are the largest and third largest in the province at 16,400 km^2 and 8,885 km^2 respectively. Nibiischii Corporation has been in charge of administering and managing these two wildlife reserves since April 1, 2017, as designated by the Cree Nation of Mistissini in accordance with provisions in the Paix des Braves and the Entente finale de règlement concernant le transfert de certaines terres de Mistissini au gouvernement du Québec (Final Settlement Agreement Concerning the Transfer of Some Mistissini Land to the Government of Québec).

Sport fishing is a major driver of the economy in Nord-du-Québec. As a result, popular fishing species such as brook trout, lake trout, walleye, and northern pike are a significant focus of the government's aquatic wildlife management. In order to support fishing for years to come, the government has put provincial management plans in place specifically for walleye and lake trout that reflect Nord-du-Québec's regional specificities. The next management plan to be developed and implemented will target brook trout. It is currently in the works. As agreed in the JBNQA, lake sturgeon, lake whitefish, round whitefish, burbot,

cisco, goldeye, mooneye, and suckers are species reserved for Aboriginal harvest on the majority of the territory covered by the Agreement and must be considered in terms of supporting subsistence fishing. These are important species to be considered in forest conservation, management, and development strategies and plans. As a final note, the fragility, federal and provincial protection status, and importance to Cree culture of lake sturgeon requires particular attention be paid to this fish when exploring development plans, logging, issuing scientific and management permits (SEG permit[1]), and developing knowledge acquisition projects.

[1] A SEG permit is issued by the Ministry for the capture of wildlife for scientific, educational, or wildlife management purposes. This type of permit authorizes a person or an organization working in these sectors to derogate, under certain conditions, from a set of legal or regulatory prohibitions.

Certain land animal species are also important to the region's cultural, economic, and conservation concerns. Moose is the quintessential species for the First Nation communities as their primary source of wild meat, and it is also important to sport hunters who live in the region.

Caribou is emblematic of the boreal forest and has particular importance for the First Nations. Four woodland caribou populations are found in the Nord-du-Québec region, namely the Detour, Nottaway, Assinica and Témiscamie. Woodland caribou is the focus of one of the province's challenges, described in Section 7.2.6.

The black bear is also of interest as a species considered both as large game and as a fur-bearing animal. It can only be trapped by beneficiaries of the northern agreements. However, sport hunters have the right to hunt in Zones 16, 17, 23, and 24. Little is known about the status of black bear populations in the region. A study is being conducted to get a more accurate estimate of the density of black bears in Québec's various bioclimatic domains, including the spruce-moss domain. A new Québec black bear management plan is also in development.

With the exception of certain sectors located in Zone 16, trapping in the forest territory is exclusively reserved for Aboriginal peoples. Members of Cree Nation communities have used a family trapline–based system for ages. Species with sought-after fur such as marten, muskrat, red fox, and beaver are the most heavily trapped. Beaver and muskrat are also part of the diet of Cree trappers. Mink, ermine, squirrel, lynx, and river otter are also prized by trappers, though in lesser proportion. Wolf and fisher are also trapped from time to time.

6.7.5. Wildlife species at-risk

Thirty wildlife species in the woodland region of Nord-du-Québec have been granted protected status. These protections result from the Loi sur les espèces menacées ou vulnérables in Québec and the Species at Risk Act in Canada. Forest planning must take the populations of these species in consideration, whether they are considered susceptible, vulnerable, or threatened in Québec, or of special concern, threatened, or endangered in Canada. Protection measures have been developed to address certain species (bald eagle, golden eagle, peregrine falcon, Barrow's goldeneye, common nighthawk, bank swallow, barn swallow) and other measures are currently being developed or improved (ex. woodland caribou,). Eight wildlife species without protected status are considered rare or unusual in the region so they also require special attention. The list of wildlife species at risk is presented in Appendix B.

6.7.6. Water resources

The Quaternary Period brought major glacial phenomena to Nord-du-Québec, including glaciation, regional readvances of glaciers, and marine and lake transgressions. Today's water systems are the result of the retreat of water from the Ojibway-Barlow glacial lake complex, the emergence of land through isostatic uplift, and the recession of the Tyrrell Sea. The water system expands as it runs from the Mistassini Highlands in the east to the Abitibi and Baie James Lowlands in the west. In the eastern sectors, there is a high density of small lakes and mid-size rivers, including Rivières Chibougamau, Témiscamie, and Rupert (the upper portion). Lac Mistassini, which at 2,200 km^2 is the largest natural lake in Québec, borders the managed boreal forest to the northeast. To the west, the large Rivières Harricana, Nottaway, and Broadback flow into Baie James. The upper sections of Rivières Rupert and Eastmain were diverted to power the La Grande Rivière hydroelectric complex. While overall lake density is low, several large lakes can be found here, including Lacs Evans, au Goéland, and Waswanipi. Most of the water in the managed forest region drains through the watersheds of Rivières Harricana, Nottaway, Broadback, and Rupert.

Sources:

DUBÉ-LOUBERT, H. (2009). *Chronologie des événements glaciaires et non glaciaires dans le cours inférieur de la rivière Harricana, Basse-terres de la baie James, Québec : Implications pour la dynamique de la calotte laurentidienne*, published by Université du Québec à Montréal, 185 pp.

LI, T. and J. P. DUCRUC (1999). *Les provinces naturelles. Niveau I du cadre écologique de référence du Québec*, Ministère de l'Environnement, 90 pp.

PARENT, M. J., S. PARADIS, G. BILODEAU, and R. PIENITZ (1996). “La déglaciation et les épisodes glaciolacustres et marins du quaternaire supérieur au sud-est de la baie d’Hudson, Québec,” *Bulletin d’information de l’Association québécoise pour l’étude du Quaternaire*, Vol. 22, 1.

6.7.7. Geological resources

Geology overview

The area of managed forest in Nord-du-Québec lies mainly in the Superior (geological) Province, on an Archean basement more than 2.5 billion years old that is especially rich in metals both precious (gold and silver) and base (copper, zinc, nickel). The basement consists primarily of tonalite intersected by bands of volcanic rock (basalt) and sedimentary rock. On the eastern side, a portion of the managed area lies in the Grenville Province, which is generally characterized by a potential for industrial minerals (silica, mica, etc.), uranium, and architectural stone. The bedrock is composed mainly of gneiss, anorthosite, and granite.

Topographical overview

The topographical profile of the region goes from a large plateau peppered with hills in the east to a plain gently sloping toward Baie James in the west. In the east, the Mistassini Highlands range from 300 to 450 m in altitude, with some peaks topping 500 m. In the Abitibi and Baie James Lowlands the altitude slowly drops from 350 m in the south and east to sea level on the shores of Baie James. Hills are few, low, and rounded, shaped by the glaciers that scraped across the region multiple times over the past million years.

Surface deposits

The last ice sheets receded 10,000 years ago during the Wisconsin Glacial Episode, forming the Harricana and Sakami moraines and the eskers of today. These are long buttes of sand and gravel partially covered in clay from the intrusion of the Ojibway-Barlow glacial lake complex and the Tyrrell Sea. The southern portion of the area is dominated by such sediment and clay, while the buttes and hills present a thin layer of glacial deposits punctuated by rocky outcrops. To the north lies the Cochrane Till, rich in carbonated minerals brought there in the Quaternary by a regional readvance of the glacial front, along with large peat bogs intersected by the sand and gravel of the Harricana Moraine, one of the largest such complexes in North America. To the east there are extensive glacial deposits, which are frequently thick, full of rocks, and sandy in texture and are intersected by large glaciofluvial sand and gravel deposits.

Sources:

DUBÉ-LOUBERT, H. (2009). *Chronologie des événements glaciaires et non glaciaires dans le cours inférieur de la rivière Harricana, Basse-terres de la baie James, Québec : Implications pour la dynamique de la calotte laurentidienne*, published by Université du Québec à Montréal, 185 pp.

HOCQ, M. et al. (1994). *Géologie du Québec*, Les Publications du Québec, 155 pp.

LI, T. and J. P. DUCRUC (1999). *Les provinces naturelles. Niveau I du cadre écologique de référence du Québec*, Ministère de l’Environnement, 90 pp.

PARENT, M. J., S. PARADIS, G. BILODEAU, and R. PIENITZ (1996). “La déglaciation et les épisodes glaciolacustres et marins du quaternaire supérieur au sud-est de la baie d'Hudson, Québec,” *Bulletin d'information de l'Association québécoise pour l'étude du Quaternaire*, Vol. 22, 1 [online] [http://www.cgcq.rncan.gc.ca/aqqua/bulle.htm] (accessed August 2, 2012).

Géoboutique Québec can provide up-to-date digital files on forests, lakes, waterways, topography, deposits, and drainage areas. Paper copies can also be obtained from various outlets.

6.8 Area in which forest management activities are carried out (MU)

The management unit (MU) contains all the forest areas in which management activities may be carried out. However, management activities may be prohibited or subject to certain conditions on some sites, usually small in size. For example, every MU has a number of “holes” formed by areas or sites where activities are prohibited or subject to special conditions.

Digital files showing all these sites are available for consultation at the Unité de Gestion associated to the current PAFIT mentioned in the title page. These files are not presented in this plan because they are updated continuously, unlike this plan, which is tabled on specific dates. However, they are considered when the plan is prepared, and when work is carried out on-site.

The Regulation respecting standards of forest management for forests in the domain of the State (Sustainable forest management rules or RADF) contains measures designed to:

- protect forest resources (water, wildlife, timber, soils);
- maintain or reconstitute the forest canopy;
- make forest management more compatible with other activities taking place in the forest;
- contribute to sustainable forest development.

For further information, you are invited to consult the text of the Regulation: https://mffp.gouv.qc.ca/RADF/guide/?lang=en

For more information about Gestion Modes per MU, see the Management Mode chart in section 6.3.

Other sites not covered by the Regulation are also protected or subject to special conditions. For example:

- Threatened or vulnerable plant and wildlife species (including those likely to be designated as threatened or vulnerable) are taken into consideration.
- Forest management activities are prohibited in proposed protected areas whose boundaries have been established by the Québec Government.
- Special conditions apply to certain wildlife sites of interest.

Table 11 : New plantings of exotic species in Nord-du-Québec for the 2013–2018 period

Exotic Species Plantings	Surface Area (ha)
Hybrid poplar	0
Norway spruce	0
Hybrid larch	0
Japanese larch	0
Total	**0**

In conclusion, zero exotic species have been replanted during the 2013–2018 period in the Nord-du-Québec region. The only exotic plantings were made several decades ago: 36 hectares of hybrid poplars in 085-51 and 6 hectares of hybrid larch in 087-63.

PART 3: Forest Development Objectives

7 Forest Development Objectives

The PAFIT presents the management objectives that are to be applied locally to every MU. These group together the MFFP's strategic objectives, resulting from the Sustainable Forest Management Strategy, and the objectives which have been defined regionally, or locally by the TLGIRTs, and which have been retained by the Minister. *Strategies that meet the various objectives are presented in section 8.*

7.1. Identification of forest management objectives

Forest management objectives are identified in various ways and can be from multiple sources. In the subsequent sections they are presented by theme, to facilitate reading. This section allows the different sources of objectives to be distinguished.

7.1.1. Provincial objectives

Provincial objectives are set out in the Sustainable Forest Management Strategy. They have been the subject of a consultation, throughout Québec, with national stakeholders in the forest sector and the general population (see the section 3.1).

7.1.2. Regional and local objectives

Regional objectives that apply to forest management of the territory of every MU are, for example, from regional analyses of ecological issues, agreements with the different nations, communities or aborigianal community groups or regional issues discussed by the TLGIRT.

Local objectives are derived from the work of the TLGIRT (described in section 5.1). These discussions carried out by the TLGIRT seek to ensure that the Ministry takes into account, from the outset of planning and throughout it, the issues of conservation and development of all the resources and functions of the environment determined consensually by the members of the TLGIRT. The TLGIRT defines the local sustainable forest management objectives and recommends to the Ministry their inclusion in the PAFIs. Subsequently, the Ministry reviews the TLGIRTs recommendations and incorporates in the PAFIs those recommendations it retains. This approach contributes to increasing the benefits and impacts for communities, including by mutual understanding of the respective interests of various actors in the same territory. Finally, integration of local objectives defined by members of the TLGIRT contributes to optimizing the use of the territory and resources.

Issues and objectives raised by the regional partners are presented in Appendix C.

7.2. Ecological issues

This section presents the provincial ecological issues, as well as their respective management objectives. It is part of one of the objectives of the challenge "Forest management that ensures the sustainability of ecosystems" of the Sustainable Forest Management Strategy (section 3.1).

Several objectives contribute to ensuring the sustainability of forest ecosystems. Certain protective measures, such as the removal of sites from forest management activities and those on which specific conditions apply, contribute to this. These sites are often protected by regulation and are considered at the earliest stages of development of the PAFIT.

Ecosystem-based management is a management approach which aims to maintain healthy and resilient ecosystems by leveraging a reduction in the difference between managed forest and natural forest. Thus, it is by maintaining the managed forests in a condition close to that of natural forests that we can best ensure the survival of most species, perpetuate the ecological processes and therefore support long-term productivity and preserve the services provided by the forest.

In order to realize implementation of ecosystem-based management, the Sustainable Forest Management Strategy plans to analyze ecological issues at the local scale. This analysis is therefore incorporated in each PAFIT and solutions adapted to the local manifestation of these issues are deployed for each MU.

7.2.1. Issue related to forest age structure

The age structure of forests is defined as being the relative proportion of stands belonging to different age classes, measured over a fairly large territory (hundreds or thousands of square kilometres). In the moss spruce forest, the spatial unit that allows analysis of the age structure is the territorial unit of analysis (UTA). Its size varies from

2,000 km^2 to 2,500 km^2. In natural forest, the forest age structure is essentially determined by the natural disturbance regimes specific to each region. Regions where severe disturbances are frequent generally contain a lower proportion of old-growth forests and a larger number of regenerating forests. The proportion of different age classes is a major characteristic of forest ecosystems and is likely to greatly influence the biodiversity and environmental processes.

Issues linked to age structure of forests are the rarefaction of old forests and the overabundance of regenerating stands).

The management objective pursued is to ensure that the age structure of managed forests is similar to that which existed in the natural forest. The ministerial target is at least 80% of the MU area should have an age structure which differs slightly or moderately from the natural forest. It is an objective of provincial origin. Table 12 shows the bounds for the different thresholds of age structure alteration.

Table 12 : Bounds for alteration thresholds of age structure

Alteration thresholds	Regeneration stage (maximum threshold)	Stage of old stand (minimum threshold)
Acceptable alteration threshold: between low and medium degrees of alteration	25% of productive area	50% of historical old-growth proportion
Alert threshold: between medium and high degrees of alteration	35% of productive area	30% of historical old-growth proportion

In order to assess the proportions of forest at “old” and “regeneration” stages, they must be defined. In moss spruce stands, the age threshold used to describe the “old” stage is 100 years while the age limit used for the “regeneration” stage is 20 years. The historical proportion of old-growth forest and regenerating forest is defined by homogeneous unit (an ecological subdivision of the land). For the MU or MU group, the homogeneous unit(s) is/are the “Western softwood forest with black spruce and typical jack pine” (ROEt) OR the “Western softwood forest with black spruce and southern jack pine” (ROEm).

The age structure alteration thresholds enable identification of the degree of alteration for each of the territory’s UTAs. Table shows the regenerating forest and old-growth forest values corresponding to the degree of alteration. It enables understanding the colours associated with each of the UTAs in the age structure maps. When the two parts of the age structure (old-growth and regenerating forests) have different values, it is the higher degree of alteration of the two that is attributed to the UTA (e.g., “medium” prevails over “low”).

Table 13 : Degrees of alteration of the age structure by homogeneous unit

Homoge-neous unit	Old-growth forests (100 years and older)				Regenerating (less than 20 years)		
	Natural proportion (%)	Low degree of alteration (%)	Medium degree of alteration (%)	High degree of alteration (%)	Low degree of alteration (%)	Medium degree of alteration (%)	High degree of alteration (%)
ROEt	49.0	24.5 and more	< 24.5 to 14.7	< 14.7	Less than 25	25 to < 35	35 and more
ROEm	49.0	24.5 and more	< 24.5 to 14.7	< 14.7	Less than 25	25 to < 35	35 and more

A detailed table of the results of each UTA of the territory is presented in the Appendix.

Sources:

BOUCHER, Y., BOUCHARD, M., GRONDIN, P. AND P. TARDIF (2011). Registry of reference states: integration of knowledge on the structure, composition and dynamics of the natural forest landscapes of southern Québec. Forest Research Paper nº 161, Direction de la recherche forestière, Gouvernement du Québec, 21 p. https://www.mffp.gouv.qc.ca/publications/forets/amenagement/registre-etats-reference.pdf

MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS (2016). Integration of ecological issues into the 2018-2023 integrated forest management plans, Book 2.1 – Issues related to the age structure of forests. Direction de l’aménagement et de l’environnement forestiers, Gouvernement du Québec, 67 p.

7.2.2. Issue related to the spatial organization of forests

The spatial organization of forests (COS) deals with the arrangement of stands at different scales of perception. The way in which these stands are organized in the

landscape has an effect on the maintenance of biodiversity and on the functioning of ecological processes. In a context of ecosystem-based management, the aim is to maintain spatial organization that is similar to what is found in unmanaged forest.

The issue recognized as related to the spatial forest organization in moss spruce stands is the maintenance or restoration of a forest mosaic in which large forested areas are preserved with little fragmentation and well distributed in the management unit.

The management objective recognized as related to this issue in moss spruce stands is to ensure the long-term availability of forested areas with little fragmentation by adequately distributing the cuts. This objective is of provincial origin.

Spatial organization compartments (COS) constitute the base element for planning deployment of cutting agglomerations as well as maintenance of forested areas throughout the planning exercise. The COS is a subdivision of the management unit. The size of a COS can vary from 30 km^2 to 150 km^2, and its contours generally coincide with those of future cutting agglomerations and forested areas. Within COS, maintaining quality and well-distributed residual forest is planned.

Certain UTRs of the southern margin of the development unit are in the balsam fir bioclimatic domain. A derogation from the RADF is presented in appendix to allow the entire MU to be managed according to the spatial organization of the moss spruce forest. See in appendix.

Source:

MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS (2017). Integration of ecological issues into the 2018-2023 integrated forest management plans, Book 3.1.1 – Issues related to tactical planning of the spatial organization of forests in moss spruce stands. Direction de l'aménagement et de l'environnement forestiers, Gouvernement du Québec, 43 p.

7.2.3. Issue related to the plant composition of forests

The issue of plant composition refers to the diversity and proportion of tree species in the forests. Plant composition plays an important role in the functioning of ecosystems both at the landscape scale and that of stands. The type of vegetation influences the availability of wildlife resources, food and habitats as well as the internal temperature of stands, the nutrient cycle and natural disturbances. As a result, forestry practices that modify the forest's plant composition can influence certain species and certain ecological processes that take place there and are therefore likely to have an impact on the maintenance of the biodiversity and viability of ecosystems.

Hardwood expansion

The invasion of cutblocks by intolerant hardwoods can occur as a result of a major disturbance, such as fire or forest harvesting. The risk of hardwood expansion increases as a function of the richness of the site. The probabilities of invasion by intolerant hardwoods also depend on the type and season of harvesting, the composition before cutting, regeneration underway and the frequency of natural and anthropogenic disturbances, a short cycle favouring invasion. In the absence of fire, pure spruce stands regenerate mainly from layering (''marcottage'' in french). This type of regeneration is more frequent in open stands and generally produces fewer spruces than after a fire. In the spruce stand, the risk of invasion by heliophile plants also increases with the space left vacant by the absence of regeneration established before or shortly after the disturbance. Shade-intolerant hardwoods can proliferate following cutting in spruce stands where they were initially rare. This is particularly the case for the trembling Aspen whose suckers after cutting results in an invasion to the detriment of spruce. Shrubs such as alders can even go so far as to compromise the eventual return of a tree stratum. Controlling hardwood expansion can contribute to maintaining mixed stands in the landscape, which could otherwise be converted into hardwood stands.

Sources:

MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS (2016). Integration of ecological issues into the 2018-2023 integrated forest management plans, Book 4.1 – Issues related to plant composition, Direction de l'aménagement et de l'environnement forestiers, 86 p.

GRONDIN, P., L. BÉLANGER, V. ROY, J. NOËL and D. HOTTE (2003). "Invasion of cutblocks by light-demanding hardwoods (hardwood expansion)", p. 131 to 174, in P. Grondin and A. Cimon, coordinators, *Biodiversity issues relating to forest composition*, Ministère des Ressources naturelles, de la Faune et des Parcs, Direction de la recherche forestière et Direction de l'environnement forestier.

MINISTÈRE DES RESSOURCES NATURELLES (2013). *Québec Forestry Guide*, Volume 1, *The biological foundations of silviculture*, a collective work under the supervision of B. Boulet and M. Huot, Les Publications du Québec, 1044 p.

Rarefaction of white spruce

White spruce is a companion species in several stands in Nord-du-Québec. Short forest cycles resulting from sustained yield have disadvantaged white spruce, whose seed production starts late. In second-growth forests after forest cutting, the white spruce seedling bank is often inadequate, compared to that of fir, for it to recolonize these sites. Generally used forestry techniques (cutting with protection of regeneration and soils [CPRS]) disturb the soil very little and do not provide favourable environments for germination of white spruce, especially when this type of cutting is done in winter when the snow cover further limits soil disturbance. In addition, harvesting of timber reduces the amount of deadwood on the ground, a major germination medium. This reduction in the number of germination beds following forest cutting is the main cause of decline of white spruce. Finally, the withdrawal of seeders following fire recovery cuts, which permits regeneration of these disturbed stands, as well as the reduction of the area exposed after a recovery from windfall (closing of pits and mounds) also caused this rarefaction.

Although this species is not common in the region, its maintenance is an essential element of a biodiversity conservation strategy.

Sources:

GRONDIN, P., J. NOËL and D. HOTTE (2003). “Rarefaction of white spruce in balsam fir stands of the boreal forest”, in P. Grondin and A. Cimon, (ed.), *Biodiversity issues relating to forest composition*, Ministère des Ressources naturelles, de la Faune et des Parcs, Direction de la recherche forestière et Direction de l’environnement forestier.

MINISTÈRE DES RESSOURCES NATURELLES (2013). *Québec Forestry Guide*, Volume 1, *The biological foundations of silviculture*, a collective work under the supervision of B. Boulet and M. Huot, Les Publications du Québec, 1044 p.

MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS (2016). Integration of ecological issues into the 2018-2023 integrated forest management plans, Book 4.1 – Issues related to plant composition. Direction de l’aménagement et de l’environnement forestiers, Gouvernement du Québec, 86 p. https://mffp.gouv.qc.ca/wp-content/uploads/Cahier_4.1_Composition_vegetale.pdf

7.2.4. Issue related to the attributes of the internal structure of forest stands and deadwood

The internal structure of stands and scarcity of deadwood refers to the spatial and temporal arrangement of living and dead plant components of a stand. The internal structure of stands influences microclimatic conditions (temperature, humidity, availability of light, etc.) and available habitats (composition of plant species, lateral cover, degree of canopy opening, height of stands, deadwood, etc.) Studies have shown that forests with a high structural diversity also support a wider variety of species or functional groups.

The issue recognized as related to the internal structure of stands and rarefaction of deadwood is the rarefaction of complex-structure stands (simplification of the internal structure of stands and rarefaction of certain forms of deadwood).

Four issues are combined here, being:

1. Rarefaction of complex-structure stands in the boreal forest;
2. Deficiencies in biological legacies in clear cuts;
3. Simplification and homogenization of second-growth forest;
4. Rarefaction of the attributes of naturally disturbed forests.

Rarefaction of complex-structure stands

The natural dynamics of boreal forest stands means that the internal structure of stands evolves over time. The longer the interval between two severe disturbances, the more chances the stand has to develop a complex structure. Clearcutting results in reconstitution of a single cohort of trees that will form a stand with a regular structure. In addition, since the forest revolutions are shorter than natural disturbance cycles, stands do not have time to re-develop a complex structure. Thus, the pace of cutting is likely to cause rarefaction of complex-structure stands at the landscape scale. This is a departure from the natural forest which leads to a rarefaction of key attributes for biodiversity.

For this issue, the objective is to determine an appropriate local target for deployment of cuts associated with the irregular forest regime. For the Nord-du-Québec region, the objective is 5% of irregular progressive cuts (explained in section 8).

Deficiencies in biological legacies in clear cuts

Biological legacies are of great importance for diversity, both for wildlife, flora and fungi. Dead or senescent wood, whether standing or on the ground, in various stages of decomposition, provides a wide range of ecological functions. Senescent or recently dead trees of large diameter are of paramount importance to cavity-nesting wildlife (which create or use cavities). The primary excavators, mainly woodpeckers, will build nesting cavities which can also be subsequently used by secondary users. The northern saw-whet owl, the northern flying squirrel and the hooded merganser are some examples. Large species, such as the common goldeneye for example, will benefit from large-diameter trees with cavities and especially those found in riparian environments. Other species, such as bats, seek snags (dead trees that are still standing) with broken crowns and hollow trunks. They will also use trees whose bark peels off to slide under to rest. The same applies for the brown creeper which builds its nest under the bark. Recently dead trees also offer an important source of food for several species of bird, given the strong colonization of these trees by xylophagous insects (that feed on wood, e.g., longhorned beetles). Stripped snags are also excellent roosts for birds of prey (e.g., bald eagle) and aerial insectivores (e.g., olive-sided flycatcher) which benefit from these exposed sites for hunting. Woody debris on the ground also plays a big role for wildlife. Amphibians and reptiles especially use them to hide and enjoy adequate temperature and humidity conditions. The ruffed grouse and spruce grouse benefit from these structures for their mating dance. These debris are also an important substrate for mosses and mushrooms, as well as to provide germination bedding for several tree species.

For this issue, the objective is to ensure a sufficient presence of biological legacies in a proportion of cutblocks with protection of regeneration and soils. In the Nord-du-Québec region, 40% of the area harvested will be in variable retention cuts.

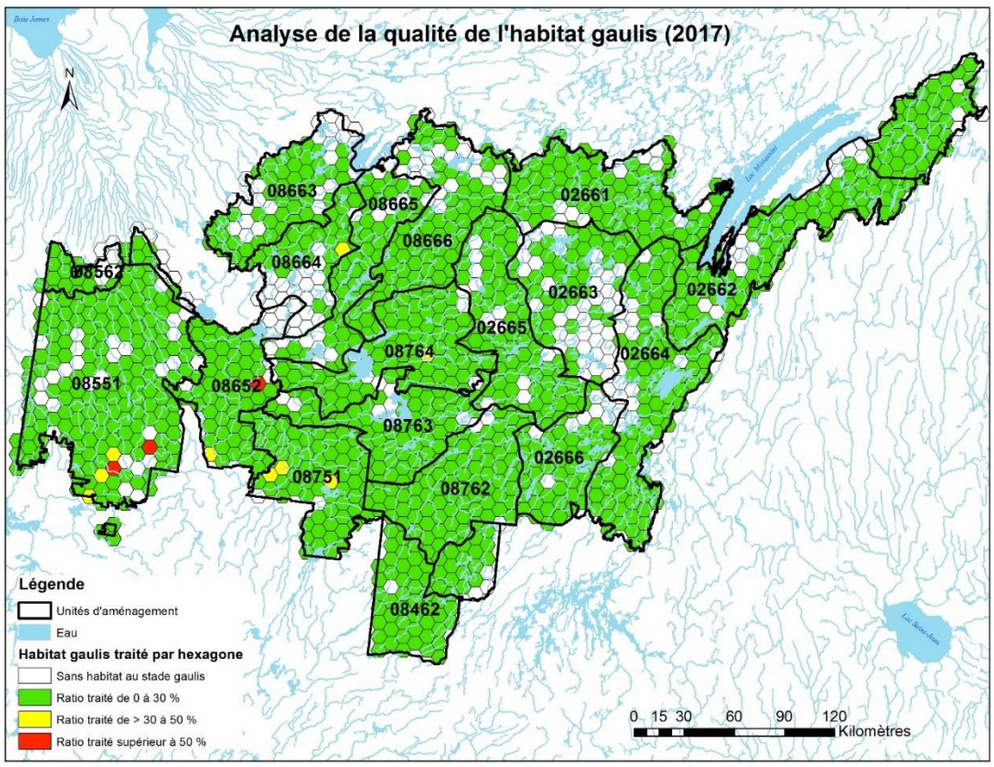
Simplification and homogenization of second-growth forest

In the Nord-du-Québec region, young stands about 10 to 25 years old offer a habitat with a high density of saplings that is beneficial to small wildlife, such as the ruffed grouse and snowshoe hare. The lateral cover is ideal for protecting from predators as well as for feeding. Other species such as the moose and black bear also appreciate these young stands for feeding.

Forest stands tending treatments, such as pre-commercial thinning, cleaning and clearing, are relevant to maintain the desired composition and control competing vegetation. These forestry activities modify the structure and composition of the young stands treated. These modifications can be, for example, homogenization of stem density and their spatial distribution, simplification of the vertical structure, reduction of lateral cover, rarefaction of fruit trees or rarefaction of dense sapling stages. Stand tending treatments in this habitat change the characteristics and make it inadequate for up to 5 years. After this period, shelter and food are in sufficient quantity to meet the needs of most species that use these environments.

In order to evaluate the issue, the MFFP created zones of 6 000 ha where the habitats quantity at the sapling stage (10 to 25 years-old) is measured. In each of the zones, the proportion of the habitat where an educational treatment has been applied within the last five years was calculated. The workbook 5.1 regarding issues related to the attributes of the internal structure of forest stands and deadwood recommends to limit the rate of treatment at 50%. Figure 4 shows results of the analysis. The red zones (hexagons) are those where the treatment rate is higher than 50%. The yellow zones have a treatment rate that exceeds 30%. Objective 1.04.1 and the related Issues and Solutions sheet present the analysis and adapted solutions.

Figure 4: Level of achievement of the wetland protection target for each management units



This issue therefore requires special attention in order to offer the availability of young, dense and diversified stands. Planners will therefore look at the distribution of stand tending treatments in time and space and use mitigation measures in the areas most at risk.

Rarefaction of the attributes of naturally disturbed forests

Naturally disturbed forests, whether by fire, insects or wind, are of great importance for wildlife. These are among others an important source of deadwood and offer favourable structural and plant diversity by favouring regeneration. In outlying regions, naturally disturbed forests are mainly the result of fire.

Burns of different ages contribute to biodiversity while the severity of the fire and the type of forests burned are conducive to a diversity of ecological conditions that influence the plant and animal communities present. Assemblages of wildlife species in burned forests differ from those found in unburned forests and burned forests that have been harvested.

The black-backed woodpecker is one of the main species associated with burns. It has also been observed that this species has better reproductive success. It particularly seeks mature burned forests since they offer larger diameter trees for nesting. In addition, xylophagous insects, the main source of food for the black-backed woodpecker, are also more abundant.

The severity of the fire will also have an influence on user fauna. A low-severity fire will offer longer-term occupancy for insects associated with deadwood. It is the same for species that feed on them, including the black-backed woodpecker, the stripe-backed woodpecker and the brown creeper. The proximity of the unburned residual forest also favours these insects and as a result other species of insectivorous birds nesting in the unburned forest.

Other species benefit from burns without being directly associated, such as the common nighthawk for nesting, the olive-sided flycatcher, the red-tailed hawk, the northern hawk-owl and the American marten for feeding. The rusty blackbird and the Canada warbler, meanwhile, use young stands after a fire to make their nest. The moose benefits from strong hardwood regeneration and the black bear from the abundance of berries to feed.

Windfall favours regeneration and offers an interesting internal structure for wildlife. It is especially conducive to creation of shelters or dens for species such as the American marten, the black bear and the forest wren.

To respond to this issue, the objective set is to maintain attributes specific to forest naturally disturbed at the wider landscape scale and in areas affected by special development plans. The recovery strategy is explained in section 8.1.8.

Sources:

MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS (2017). Integration of ecological issues into the 2018-2023 integrated forest management plans, Book 5.1 – Issues related to attributes of internal structure of stands and deadwood. Direction de l'aménagement et de l'environnement forestiers, forestiers, Gouvernement du Québec, 66 p.
https://mffp.gouv.qc.ca/wp-content/uploads/cahier_5_1_structure_interne.pdf

NAPPI, A. AND OTHERS (2011). Harvesting in burned forests – Issues and guidelines for ecosystem management. Ministère des Ressources naturelles et de la Faune, Direction de l'environnement et de la protection des forêts, Gouvernement du Québec, 51 p.

7.2.5. Issue related to wetlands and riparian environments

Wetlands and riparian environments are recognized for their wide biological diversity both because of the variety of species they shelter and because of the wide range of habitats they group together. These complex environments exercise several ecological functions essential to terrestrial and aquatic ecosystems, for maintenance of biological diversity and for maintenance of forest productivity. They are among the most biologically productive ecosystems and are home to a significant portion of biodiversity.

Although some of these environments are protected by legislation, some rare, sensitive or small-sized environments are sometimes excluded from current regulations.

Two objectives are associated with this issue, being:

- diversifying the development of riparian environments;
- protecting wetlands.

Riparian environments

Riparian environments provide several functions that testify to their importance. They act as habitats for fauna and flora, and particularly for several threatened or vulnerable species; they permit connectivity between aquatic and terrestrial environments; they contribute to water purification and sediment retention and thus to preservation of the drinking water supply. They promote the visual quality of landscapes, thus contributing to recreational and tourist activities.

Riparian environments are beneficial to a large majority of species. The Canadian beaver uses them for feeding and finding materials for construction of its lodge and dams. It is particularly fond of the trembling Aspen and other hardwoods near the water. The moose uses the riparian environment for travel and feeding. It prefers wide riparian strips with a protective cover, with conifers in winter. The American marten also uses the riparian environment for travel. The snowshoe hare meanwhile benefits from the hardwood or mixed species microhabitats that it finds there for feeding. Cavity-nesting waterfowl, such as the common goldeneye, are particularly fond of large hollow trees in the riparian strip for nesting. Still other species depend on the riparian environment to survive. For example, river otters, American mink, amphibians (frogs and salamanders), muskrats, Canada warblers, northern waterthrush and the Wilson's warbler are also users.

Analysis of the modalities applied to riparian environments is underway at this time. It will be completed by considering the wildlife, social and biodiversity issues associated with these environments.

Source:

MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS (2015). Integration of ecological issues into the 2018-2023 integrated forest management plans, Book 6.1 – Issues related to riparian environments. Direction de l'aménagement et de l'environnement forestiers, Gouvernement du Québec, 44 p. https://mffp.gouv.qc.ca/wp-content/uploads/Cahier_6.1_enjeux_milieux_riverains.pdf

Wetlands

A particular biodiversity is associated with wetlands. Among the important wetlands, fens are habitats rich in biodiversity and especially in rare plant species. Several plants at risk are found there (for example, the American calypso, Robbin's spikerush or the round-leaved orchis).[7] In addition, very poor wetlands (ombrotrophic) are home to another procession of equally unique species, such as the linear leaf sundew and the utriculars. Of course, wetlands are an essential habitat for amphibians and reptiles. They also form part of the moose habitat, which uses peat bogs for spring calving.

[7] Consult Appendix B on the EMVS for a brief description of the habitat for each species.

Woodland caribou congregate on peat bogs in the fall during rutting. Wetlands and the border between these environments and the forest environment are sought by several species of birds, such as the spruce grouse, rusty blackbird, olive-sided flycatcher and Canada warbler. Several of them are at risk.

For each of the region's MUs, the proportion of protected wetlands was analyzed in October 2017. The objective was first to know the proportion of wetlands permanently protected (protected areas registered in the Register of Protected Areas, see section 6.3). Then, since the region has large areas protected administratively (including for protection of the woodland caribou's habitat), the proportion of administratively protected wetlands was also calculated.

The target to be achieved for wetland protection is 12% of the MU's wetlands to be considered adequate protection. If the proportion of protected wetlands is less than the target, an additional area of wetlands equivalent to 1% of the MU's total area must be protected or the missing portion to achieve 12%. The lowest of the two areas is selected. The VOIT 1.08.1 in the complementary document summarizes the method to determine if the current wetland protection is adequate. Wetland protection was assessed for each MU (Figure 5).

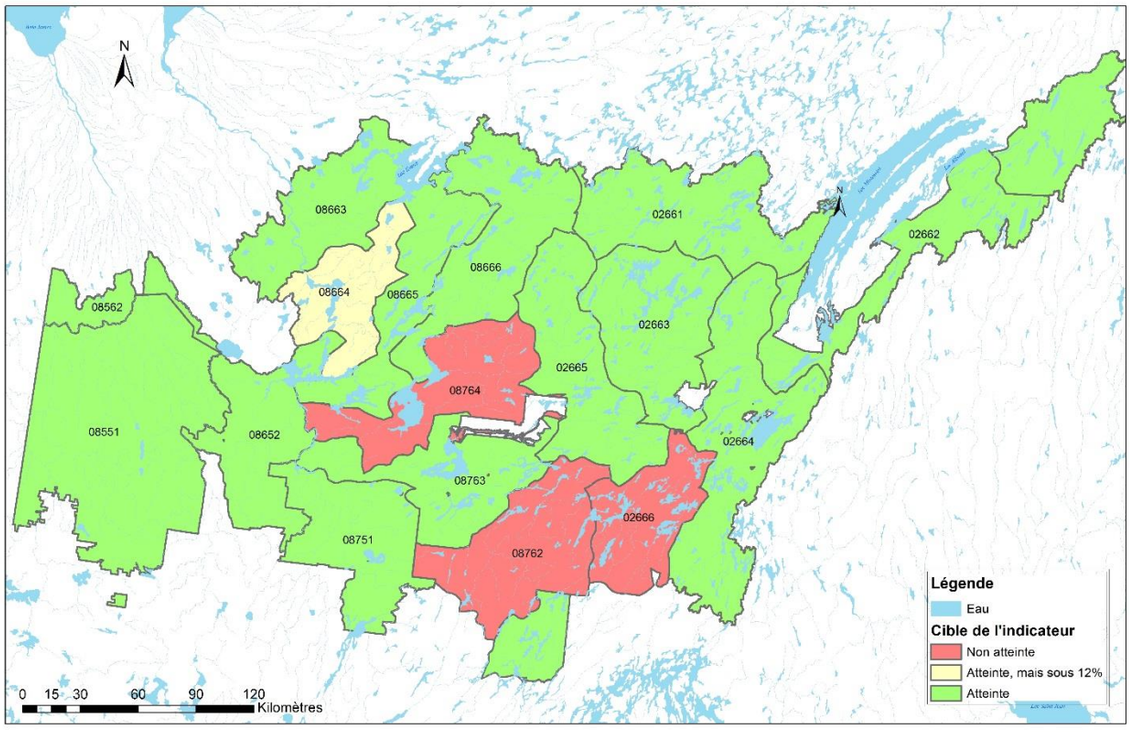


Figure 5 : Level of achievement of the wetland protection target for each management units

For MU 086-52, only 4% of wetlands are protected. 1,500 additional hectares of protected wetlands would be necessary to achieve the target, an addition of 1% of MU's wetland environment protected.

To optimize wetland protection, it is interesting to target several criteria to identify wetlands that may require more particular protection. The following criteria are proposed:

- The presence of particular fauna or flora species, whether wildlife habitats, species with at-risk status, rare, susceptible to forest management or priority marsh species;
- Ecological services rendered by the community. For example, water filtration or its use for recreational purposes (hunting, fishing, tourism, education);
- Rare types of wetlands in the region.

Source:

MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS (2016). Integration of ecological issues into the 2018-2023 integrated forest management plans, Book 6.2 – Issues related to wetlands. Direction de l'aménagement et de l'environnement forestiers, Gouvernement du Québec, 58 p. https://mffp.gouv.qc.ca/wp-content/uploads/Cahier_6.2_Milieux_humides.pdf

7.2.6. Issue related to species requiring special attention for their maintenance

The forest is the habitat for many fauna and flora species. Consequently, different forest management activities can greatly affect the abundance, distribution and survival of these species by modification of various forest attributes. Efforts made by ecosystem forest management (see the issues above) are a first step in ensuring the maintenance

of habitats and biodiversity. However, many species have special needs that cannot reliably be met by ecosystem-based management. This is why the integration of needs for at-risk species and those sensitive to forest management is an important step.

The objective of this issue is to ensure that the habitat needs of at-risk species and those sensitive to forest management are taken into account during forest planning. The strategy adopted for this issue therefore uses a variety of approaches and tools that use a coarse filter and a fine filter.

The coarse filter approach is defined as follows: “Approach to biodiversity conservation by the maintenance, at the landscape scale, of the diversity of species, habitats and ecosystems representative of natural forests.” The fine filter approach is defined as follows: “Approach to biodiversity conservation by implementing specific measures for the ecosystems, habitats or species whose survival is not assured despite the application of the coarse filter approach.”

Fine filter approach

The goal of the MFFP in this case is to respect the terms of intervention or protection measures associate with threatened and vulnerable species, wildlife habitats and wildlife sites of interest (SFI, Sites d’intérêts fauniques).

Indeed, protection measures have been developed for the golden eagle, peregrine falcon, Barrow’s goldeneye, bald eagle, the common nighthawk, bank swallow and barn swallow (see Appendix B). Other measures are being developed or improved for the woodland caribou (forest ecotype).

Certain specific wildlife habitats are protected by the Regulation respecting wildlife habitats of the Act respecting the conservation and development of wildlife in Québec, of which the following are of particular concern in the region:

- caribou calving area north of the 52nd parallel;
- habitat of a threatened or vulnerable wildlife species;
- fish habitat;
- muskrat habitat;
- heronry.

Wildlife sites of interest are habitats of regional importance which benefit from specific methods. Among these, spawning grounds are particularly targeted in the region. Updating of wildlife sites of interest is planned during next year.

Coarse filter approach

The objective of the MFFP in this case is to consider the habitat needs for sensitive species to integrate them into the management strategy. To do this, the effects on habitats of the current approach applied on the territory must be analyzed, adapting, if required, the targets and management solutions to accommodate species’ needs.

Four species were selected as species of provincial interest sensitive to moss spruce forest management. They are the woodland caribou [for more details, see section 8.1.4, the American marten, the black-backed woodpecker and the stripe-backed woodpecker. In addition to these, focal species, with needs also covering those of other species, were selected. For example, the moose, black bear and fish are considered.

In order to integrate wildlife issues with forest planning, analysis work is underway. To do this, the needs of species sensitive to forest management are defined using scientific literature and traditional aboriginal knowledge. The thresholds of the different habitat variables are determined according to the various ecological issues associated with these species (Table 14). Gaps are then measured to assess whether the territory offers the habitat necessary for these species. If not, methods could then be developed to integrate these wildlife issues.

Table 14 : Sensitive species of interest and the main associated ecological issues

Species	Deadwood	Composition	Recently naturally disturbed forest	Aquatic environment	Wetlands	Riparian environments	Spatial organization	Age structure	Internal structure
Woodland caribou		X			X		X	X	
Canadian beaver		X		X	X	X			
Cavity-nesting species*	X	X	X			X		X	X
Ruffed grouse	X	X					X	X	X
Snowshoe hare		X				X	X	X	X
American marten	X	X					X	X	X
Moose		X	X	X	X	X	X	X	X
Black bear	X	X	X	X			X	X	X
Black-backed woodpecker	X	X	X				X	X	X
Stripe-backed woodpecker	X	X	X				X	X	X
Fish				X	X	X	X		
Spruce grouse	X	X			X	X	X	X	X

* Cavity-nesting species: Species that use cavities for nesting.

Source:

CHEVEAU, M. (2015). Process of selection of species sensitive to forest management of provincial interest. Ministère des Forêts, de la Faune et des Parcs du Québec, Direction générale de l'expertise sur la faune et ses habitats, Gouvernement du Québec, 16 p.

7.3. Timber production taking into account the ecology of sites and objectives

The Sustainable Forest Managment Strategy mentions that the challenge is to make the best possible use of what the forest can produce in timber and other resources and functions, while respecting the production capacity of forest ecosystems (section 3.1).

With silviculture, forest production can be improved. By basing it on the ecological characteristics of sites and the objectives pursued, forestry interventions that maximize the forest's potential are the subject of a choice.

To enhance the forestry efforts deployed, the MFFP has developed guides so that silvicultural practices in Québec are adapted to the ecology of the sites and the multiple management objectives sought. These guides also contain the choices of possible silvicultural scenarios (or treatment sequences) so that the management strategy permits timber production, while respecting sites' production capacity and their constraints in relation to management (risk of windfall, susceptibility to insects and diseases, trafficability, etc.).

In Québec, natural regeneration is largely favoured. For sites that do not regenerate naturally, in-filling or tree planting with native species is recommended.

Finally, it is important to note than in all MUs the use of herbicides is prohibited.

7.3.1. Issue of maintaining forest productivity

In the Nord-du-Québec region, two types of sites include obstacles to forest productivity and deserve special attention. These are sites susceptible to:

- ericaceous invasion;
- paludification.

Paludification

The paludification process is explained by the prolonged absence of severe disturbance on a topographical plane and/or soil with low permeability. With time since fire, opening of the softwood stand changes the quantity of light reaching the ground. This modification of the environment leads to a succession of mosses. Shade-tolerant mosses are progressively replaced by shade-intolerant sphagnum, increasingly resistant to decomposition. The succession of mosses influences the forest floor, which becomes increasingly cold and wet. The water table gradually rises and makes nutrients hard to access. Throughout the process, trees are limited in nutrients and growth conditions deteriorate, which changes the stand's productivity.

The objective for every MU is to maintain the yield of forest stands susceptible to paludification or paludified.

The strategy for achieving this objective is presented in section 8.1.5.

Sources:

MINISTÈRE DES RESSOURCES NATURELLES (2013). *Québec Forestry Guide*, Volume 1, *The biological foundations of silviculture*, a collective work under the supervision of B. Boulet and M. Huot, Les Publications du Québec, 1044 p.

FENTON. N., and Y. BERGERON, 2006. Facilitative succession in a boreal bryophyte community driven by changes in available moisture and light. Journal of Vegetation Science 17:65-76.

SIMARD, M., N. LECOMTE, Y. BERGERON, P.-Y. BERNIER and D. PARÉ (2007). “Forest productivity decline caused by successional paludification of boreal soils”, *Ecological Applications*, 17, p. 1619-1637.

7.4. Integrated development of forest resources and functions

PAFIT also incorporates objectives related to development as well as protection of the various forest resources and functions, including wildlife habitats, tourist recreation products, non-timber forest products, maple syrup production, the visual quality of landscapes, management of access roads, etc. These objectives are discussed and adopted at the TLGIRTs.

Visual quality of landscapes

Maintaining the visual quality of landscapes is a concern expressed by some users of the forest environment. With regard to landscape quality, forest interventions have an impact on two levels. At a first level, they have a social impact when they lead to a degradation of the visual quality of the landscapes to which the local population is attached, since these landscapes constitute their living environment. At a second level, these interventions have an economic impact, since, for many recreational forest tourism industries, the quality of the product and experience is based on the aesthetic framework provided by landscapes in the forest environment. Strategies and solutions for this issue are detailed in section 8.1.12.

Source : https://mffp.gouv.qc.ca/publications/forets/consultation/outil-decision.pdf)

Non-timber forest products

Non-timber forest products (also known as PFNL, produits forestiers non ligneux) are products of biological origin other than timber, used for medicinal, food, ornamental or industrial purposes. Their harvest can lead to job creation. Therefore, conservation of key areas for non-timber forest product of interest is required. However, in order to protect certain sites of interest while preserving their confidentiality, users and the MFFP must agree on harmonization measures at the time of the consultation of the PAFIOs.

Source : http://www.rncan.gc.ca/forets/industrie/demandes/13204)

PART 4: Integrated Forest Development Strategy

8 Forest Development Strategy

The forest management strategy translates all actions taken to meet the various management objectives. Its preparation is part of an iterative process by which solutions to the issues selected and, sometimes, the management objectives are adjusted as the strategy is developed. Thus, the environmental, social and economic effects are reviewed to determine the optimal solutions. This implies that the management objectives will only be ultimately fixed at the end of the process.

8.1. Identification of solutions to achieve the objectives

To facilitate preparation of the forest management strategy and for the purpose of synergy and complementarity of solutions put forward, a consolidation of the issues requiring similar solutions is first done.

Table 15 : Grouping of issues requiring similar solutions (R13.0)

No	SFD Criterion	No	Issue
1	Conservation of biological diversity	1.01	Changes in plant composition.
		1.02	Rarefaction of complex-structure stands in the boreal forest
		1.03	Deficiencies in biological legacies in clear cuts
		1.04	Simplification and homogenization of second-growth forest
		1.05	Rarefaction of the attributes of naturally disturbed forests
		1.06	Spatial organization of forests
		1.07	Species requiring special attention for their maintenance
		1.08	Ecological functions fulfilled by wetlands and riparian environments
		1.09	Age structure of forests (rarefaction of old forests and overabundance of regenerating stands)
2	Maintenance and improvement of forest ecosystem state and productivity	2.01	Productivity and sustainability of forest ecosystems
3	Soil and water conservation	3.02	Quality of the aquatic environment and integrity of aquatic ecosystems
5	Maintenance of multiple socio-economic benefits that the forest provides society	5.01	Diversification of forest uses and products
		5.02	Visual quality of landscapes
6	Taking into account, in development choices, the values and needs expressed by the populations concerned	6.03	Integrity of sensitive sites and sites of interest to Aboriginals

Subsequently, solutions are developed to meet the different groupings of issues. These solutions are either related to conservation actions and to the method of spatial and temporal distribution of forest interventions, or to forestry actions. The different columns of Table 16 represent a summary of solutions associated with each of the PAFIT's issues. These solutions are described further in this section.

Table 16 : Management objectives and applicable solutions (R14.0)

N°	Objective	Site preparation	Reforestation (tree planting or in-filling)	Lenghtening rotations	Wildlife analysis of managment plans	Riparian strips	Conservation	Clearcut	Wildlife habitat directives	Forest stands tending treatments	Harmonization of uses	Biological legacies	Maintainance of disturbed forest	Modalities for caribou	Access road planing	Partial harvesting	Spatial distribution	Sound forestry practices	Reporting habitats	Mixedwood stands management strategy	Monitoring
1.01.1	Minimizing gap between managed and natural forests - To limit hardwood expansion	X	X						X							X				X	X
1.01.3	Maintaining or increasing white spruce abundance	X									X					X				X	
1.02.1	Maintaining sufficient old-growth stands with irregular structure			X			X									X					
1.03.1	Minimizing gap between managed and natural forests - deadwood rarefaction										X										
1.04.1	Limiting internal structure simplification in young second-growth stands								X	X	X										
1.05.1	Maintaining attributes specific to forests naturally disturbed at the landscape scale and in areas affected by special management plans						X					X									

Nº	Objective	Site preparation	Reforestation (tree planting or in-filling)	Lenghtening rotations	Wildlife analysis of managment plans	Riparian strips	Conservation	Clearcut	Wildlife habitat directives	Forest stands tending treatments	Harmonization of uses	Biological legacies	Maintainance of disturbed forest	Modalities for caribou	Access road planing	Partial harvesting	Spatial distribution	Sound forestry practices	Reporting habitats	Mixedwood stands management strategy	Monitoring
1.06.1	Applying a distribution model of forest interventions that is inspired by the natural forest		X								X										X
1.07.1	Considering sensitive species habitat needs in forest management			X	X	X	X		X		X	X		X	X	X	X	X	X		
1.07.2	Contributing to woodland caribou recovery by applying forest management modalities that maintain suitable habitat												X								
1.08.1	Protecting wetlands						X														
1.08.2	Diversifying management of riparian environments					X				X				X		X	X				
1.09.1	Minimizing gap between managed and natural forests - forest age structure			X			X						X								
2.01.1	Maintaining the productivity of forest ecosystems susceptible to ericaceous invasion	X	X					X												X	X

Nº	Objective	Site preparation	Reforestation (tree planting or in-filling)	Lenghtening rotations	Wildlife analysis of managment plans	Riparian strips	Conservation	Clearcut	Wildlife habitat directives	Forest stands tending treatments	Harmonization of uses	Biological legacies	Maintainance of disturbed forest	Modalities for caribou	Access road planing	Partial harvesting	Spatial distribution	Sound forestry practices	Reporting habitats	Mixedwood stands management strategy	Monitoring
2.01.2	Maintaining the productivity of forest ecosystems susceptible to paludification		X																		X
3.02.1	Reducing the impacts of forest operations on aquatic ecosystems				X	X					X			X	X		X	X			
3.02.2	Protecting fish habitat, especially spawning grounds				X	X								X	X			X	X		
5.01.1	Supporting the development of non-timber forest products									X											
5.02.1	Maintaining the visual quality of landscapes in priority locations					X				X	X					X	X				
6.03.1	Maintaining an environment around sensitive sites and sites of interest that ensure continuation of traditional activities					X	X		X	X	X					X	X	X			

8.1.1. Silvicultural treatments

Several solutions are found in the type of silvicultural treatment that will be selected on the site where a given issue is found. There are four categories of silvicultural treatments that are described in section 8.5.2 of this document: [8] regeneration processes, site treatments, artificial regeneration treatments and stands tending treatments.

Regeneration processes

Among regeneration processes, variable retention cutting is an interesting solution to maintain biological legacies in cutting agglomerations. They can favour natural regeneration of white spruce, or facilitate maintenance of habitat components in the harvested area.

Progressive irregular cuttings, another regeneration process, conserve sufficient forest cover to maintain attributes of mature and old-growth forests. By preserving sufficient cover, they also contribute to curbing hardwood expansion. They are also an asset in maintaining the aesthetic quality of the landscapes.

Site treatment

Field preparation (notably scarifying) contributes to maintaining the productivity of sites which have paludification and ericaceous invasion issues. Where hardwood expansion is an issue, field preparation can reduce it.

Artificial regeneration treatment

Tree planting or in-filling with white spruce allows this species to be maintained in managed forests. Tree planting is also an important step for maintaining forest productivity at sites where there are issues of paludification or ericaceous invasion.

Forest stands tending treatments

Stands tending treatments, particularly cleaning or pre-commercial clearing (EPC) can change the structure and composition of the stand. This is useful, for example, to counteract invasion of young stands by competing hardwood species. These benefits can be disadvantageous in other respects, however. This is the case, for example, for the snowshoe hare whose habitat loses its interesting characteristics during the few years following stands tending treatments. The adoption of mitigation measures when carrying out stands tending treatments is therefore recommended. Also, spacing stands tending treatments over time in young and dense habitats that are suitable for small wildlife will allow sufficient availability of this type of habitat at all times.

8.1.2. Age structure of forests

Targeted degrees of alteration and lengthening of cycles

Solutions for the age structure issue are reflected in the targets for old-growth forests and regenerating forests by UTA. In Map 10 illustrates the targets for every MU (target degrees, current degrees). These constraints relating to forest age force the lengthening of cycles of UTAs with too many regenerating forests or not enough old-growth forests relative to their target.Lengthening of cycles means that stands, although ready for harvesting, are not harvested and continue to age. During operational planning, the choice of stands of interest for conservation in the selection of residual forest blocks, for example, allow for lengthening of the cycle. These stands of interest may be, in particular, old-growth forests, mature mixed stands, irregular stands or other habitats of interest.

Age structure restoration plan

When the departmental target requesting that the area of UTAs with a low or medium alteration level is not reached, an ecological restoration plan must be defined. This plan contributes to planning the harvest in the territory in order to allow for the return to the targeted alteration level. The restoration plan must present three management objectives, being:

- ensure the maintenance of old-growth forests and their representativeness on the territory;
- organize short-term recruitment (nearby recruits);

[8] There is also a lot of information in the *Québec Forestry Guide*, Volume 2, available in print or online, https://mffp.gouv.qc.ca/les-forets/connaissances-forestieres-environnementales/le-guide-sylvicole-du-quebec.

– favour medium and long-term recruitment (distant recruits).

A restoration plan was developed for MU 086-52.

The situation as at April 1, 2018, is shown in Table 1, along with the target situation for the end of the restoration period. To achieve the target situation, harvesting is regulated in all the UTAs. The implementation period is explained by the shortage of short-term old-growth forest recruitment in UTA 2.

Table 17. Situation as at April 1, 2018 and age structure restoration plan for the MU.

Territorial analysis unit (UTA)	Homogeneous unit	Situation as at April 1, 2018					Restoration plan	
		Old-growth forests		Regeneration		Overall level of alteration		
		Area occupied (%)	Level of alteration	Area occupied (%)	Level of alteration		Target level	Time frame (years)
UTA 1	ROEt	29.5	LOW	13.0	LOW	LOW	MODERATE	0
UTA 2	ROEt	10.7	HIGH	28.8	MODERATE	HIGH	MODERATE	30

8.1.3. Spatial organization of forests

Spatial organization compartments

Map 11 shows the various types of spatial organisation compartments (COS) present in the MU. In addition to protected areas, which are excluded from forest management, there are COS called “standard” and COS called “managed core areas.” Standard COS can be, at one time or another over a 150-year horizon, the subject of a cutting agglomeration. Managed core area COS ranges, meanwhile, are destined to be harvested at low intensity (smaller cuts, partial cuts, etc.). They retain the qualities of forested areas throughout the planning horizon.

Forested core areas are characterized by COS with at least 70% of the forest being 7 m or more in height. All forested areas must at all times cover 20% of the MU area. Map 12 shows the current distribution of forested areas in the MU. To maintain good distribution of forested core areas, areas called “sensitive” are identified. Maintenance of these enables maintaining an area of influence of forested areas within the MU. They may not be harvested in the short term, unless they are managed core areas.

Map 13 in Appendix A shows the harvest priorities help the manager choose which COS will be the subject of priority harvesting. Harvesting priority 1 (acceptable) and 2 (moderately acceptable) are those which should be selected first during operational planning. Harvest priorities are mainly based on the age structure of stands within each COS and on the analysis of the state of adjacent COS.

Residual forest

Maintaining a minimum of 30% of the productive area in the form of residual forest for each cutting agglomeration is the final level of harvest planning. This residual forest is essential to maintaining biodiversity at the scale of the disturbance. Criteria of quality, configuration and representativeness of the residual forest ensure that it will play its role well. For example, blocks of sufficient size and of compact shape must be planned to allow for maintenance of the forest within the cutting agglomerations themselves.

Spatial distribution of cuts in time and space

The way in which the cuttings and residual forest are configured may help solve certain issues. For example, the residual forest may be planned to:

– maintain connectivity between habitats;
– mitigate the visual effects the harvest on an important site (such as a lookout, tourist site or an Aboriginal gathering site). This aspect of spatial distribution is addressed in section 8.1.12 on the Visual quality of landscapes.

8.1.4. Recovery of the woodland caribou

The woodland caribou is one of the ecotypes of the woodland caribou (Rangifer tarandus caribou). It is found year-round in the boreal forest and the southern limit of its range has steadily regressed northward. Woodland caribou live in small groups of low density. It possesses low potential for recruitment, a factor that limits population growth. However, to explain its decline in recent decades, other reasons are cited,

including the significant increase in anthropogenic disturbances and disruptions in its habitat. Fragmentation of the forest matrix by forest harvesting, road construction and natural disturbances (fire, windfall) reduces the quantity and quality of its habitat. In addition, cuttings cause the rejuvenation of stands and regeneration of hardwood species. These modifications favour the arrival of predators such as grey wolf (via the moose) and black bear (via production of berries). Modification of the habitat thus contributes to the decline of woodland caribou populations.

In March 2005, the Gouvernement du Québec granted the woodland caribou the status of vulnerable species under the Act respecting threatened or vulnerable species. In addition, under the federal government's Species at Risk Act, the woodland (forest) caribou has had status as a threatened species since 2002. Habitat conservation is the key to recovery of the woodland caribou. In general, recovery of viable populations in managed forests will depend on the maintenance of large undisturbed softwood stands, a reduction of the density of forest roads and the recruitment of forested areas in disturbed sectors.

In April 2016, the Gouvernement du Québec announced its Action Plan to Manage the Woodland Caribou Habitat. In the context of sustainable forest management, the government intends to implement a balanced approach which consists of focusing most of the effort on key habitat elements where there are the best chances of success. This plan presents the government's guidelines for management of woodland caribou habitats and is divided into two phases:

- Phase 1 of the plan consists of setting concrete actions from now to maintain the essential components of the caribou habitat. For the Nord-du-Québec region, this involves:
  - forest planning adapted to provide large areas for caribou in at least two sectors:
    - the Rivière Broadback valley (Nottaway herd);
    - north of La Sarre (Detour herd).
  - creation of a protected area in the Rivière Broadback valley, which was decreed in the fall of 2017.
- The purpose of Phase 2 is to develop a long-term strategy that will draw on detailed analyses of the socio-economic consequences of proposed measures and alternative sources of timber supply.

The Detour herd, the major portion of which is located outside the territory of application of Chapter 3 of the Paix des Braves, benefits from a woodland caribou management and protection plan developed in 2007 and updated in 2015 to incorporate new scientific knowledge about the species. This plan will be updated between now and 2022, based on the provincial strategy. In the meantime, the plan will be maintained and interim measures have been in force since April 2019. The objective of the plan for the Detour herd and its addenda is to ensure that forest management contributes to the recovery of woodland caribou populations and the interim measures provide protection for sectors of key importance to the conservation or restoration of woodland caribou habitat.

The map presenting the woodland caribou management and protection terms is found in Appendix A.

8.1.5. Strategy to counteract paludification and ericaceous invasion

8.1.5.1. Strategy to counteract paludification

The risk of not applying sustainable management to these MUs was assessed using two elements, namely accessibility and level of paludification in the stand. Ecological types (RE26, RE37, RE38 and RE39) have paludification level indicators and can be used to assess the probability of success using land preparation techniques. The probability of success is high for RE26 and declines gradually to almost zero for RE39. Stand accessibility influences choices regarding restoration of production and operational profitability. Zoning has therefore been prepared to manage paludification risks:

- Paludified landscapes are large areas in which paludified stands are concentrated and to which access is possible only in winter due to the moisture conditions and shortage of materials to build roads. Operations in these landscapes would be below breakeven and virtually impossible to carry out from an operational standpoint. Ideally, forestry operations should not take place in paludified stands (or stands likely to become paludified) located in paludified landscapes. For the period 2018-2023, logging

operations have been prohibited in a significant percentage of paludified landscapes due to overlapping of interim measures for woodland caribou. The sectors of paludified landscapes to be logged in the period 2018-2023 will be tested or monitored carefully to reduce uncertainty concerning operational viability.

- Paludified stands (or stands likely to become paludified) that are located outside paludified landscapes and are accessible should first be restored to production (scarification and reforestation), since there is less uncertainty regarding the efficiency of these measures. Scarification (1 or 2 passes) may be performed with a T26 or harrows, depending on the site. Harrows are more effective on sites where the organic layer is thicker, and are more efficient at reducing competition with ericaceous plants. They should be given priority in most cases. Reforestation should be carried out at a rate of 2,000 trees/ha in order to reconstitute the forest canopy as quickly as possible, to give the stand a competitive advantage over moss and sphagnum. Outside the woodland caribou habitat, trembling aspen trees should be maintained whenever the species is already present on a site (no more than 30% to 40% of the area). Reforestation with a certain percentage of tamarack could be carried out in particular on wetter sites.
- For paludified stands (or stands likely to become paludified) that are located outside paludified landscapes and are inaccessible, the planner, depending on location, productivity and maturity of surrounding stands, should decide whether or not it is strategically appropriate to develop access for harvesting and restoration of production. If so, the most effective solutions should be selected (scarification and reforestation), but with the investment required to build a class 4 or class 5 road (not a winter road). These choices should be made sparingly, since MÉRIS assessments have suggested that this type of investment will not be profitable for many of the sites concerned. If it is not considered appropriate to develop an access road, the stands will follow the sylvicultural scenario provided for in the allowable cut calculation or will undergo winter land preparation with solutions that are usually more expensive and less effective. It is still possible to develop innovative solutions and this will be explored for the period 2018-2023.

For additional information, please see the detailed management strategy for paludification in Appendix H.

8.1.5.2. Strategy to counteract invasion by ericaceous vegetation

The stations identified as problems are ecological types RE12, RE20, RE21, RE22, and RE37. Ecological type RE37 is associated with the problems of ericaceous plants and paludification. For the management units targeted by the paludification management strategy (MU 08551, 08562, 08652, 08663, 08664, 08665), ecological type RE37 will not be addressed by the management strategy for ericaceous plants. Ecological type RE12, associated with ericaceous plants and forest stands with lichen, is governed by a section in the Regulation respecting the sustainable development of forests (RSDF), and forest management activities are prohibited if they would take place in the area covered by the woodland caribou restoration plan produced by Québec's woodland caribou restoration team. When calculating allowable cuts, the Chief Forester excludes all forest areas covered by legislative or regulatory provisions prohibiting forestry operations. Hence, management strategies will not be prepared for this ecological type where it is located in the area covered by the caribou restoration plan. However, it may be managed outside that area.

Since ericaceous plants have the ability to spread quickly after logging, due to the open forest canopy and increased sunlight, it is vital to limit, slow down or eliminate colonization of logging areas by ericaceous plants in order to give the saplings an opportunity to grow to a height of one metre, at which the inhibiting effect of the ericaceous plants no longer restricts tree growth.

Therefore, where tall regeneration is present at an acceptable density to form the new stand, the opportunity to carry out cutting with protection of tall regeneration and soils should be seized, even though the Chief Forester currently applies the same regeneration periods to this type of treatment. On the other hand, where the regeneration is insufficient to constitute a merchantable stand at maturity, cutting with protection of regeneration and soils, followed by full-scale land preparation using hydraulic disc devices or harrows, should be prescribed.

Where there is some question as to whether or not land preparation should be carried out, a certain number of criteria will be assessed to guide the planner's decision:

- Operational profitability depends on the site's accessibility. If a stand likely to be invaded by ericaceous plants is accessible, treatment should be carried out because a return on the investment will very probably be achieved.
- Operational profitability also depends on transportation distance. If a stand likely to be invaded by ericaceous plants is located close to a processing plant, treatment should be carried out because a return on the investment will very probably be achieved.
- The social acceptability of land preparation must also be taken into account. If social acceptability is present in the sector in which the stand likely to be invaded by ericaceous plants is located, treatment should be carried out because other opportunities that are not socially acceptable will be missed.
- Clearly, other issues requiring the use of the sylvicultural budget must also be considered. For example, the added value to be obtained from land preparation followed by reforestation for a stand likely to be invaded by ericaceous plants must be compared with the added value from investing in a solution to a different issue. During this type of comparison, it is important to remember that a growth period of 25 years must be avoided as far as possible, but that, even without land preparation, the stand will be used to establish allowable cuts in the long term; this would not be the case for a paludified stand. In addition, in the areas to be covered by the proposed woodland caribou strategy, investments in access road construction and land preparation followed by reforestation may not be beneficial given that the area may have to be closed to ensure recruitment of a less fragmented forest block.

8.1.6. Main infrastructure and access roads

Location of main infrastructure and main roads (R11)

The main infrastructure and the main roads are located to determine access constraints and to permit connection with future roads planned in order to enhance the value of all forest environment resources. The map presenting the forest roads to be maintained and developed for the MU is found in Appendix A.

Access road management plan

Management of access roads is a key element for reducing the environmental impacts associated with forest management. Indeed, the network of forest roads influences, among others, the quality of the water, fish habitat and wildlife habitats, including that of woodland caribou. Preparation and implementation of an access road management plan is a complex and colossal task, however. In order to obtain the population's support through a common understanding of the values and issues related to the forest road network, progress will be gradual and will require the collaboration of all MFFP partners. Given the current implementation of the Action Plan to Manage the Woodland Caribou Habitat, announced in April 2016, priority will be given to the territory frequented by this species. Over the years and with the collective work of regional partners, attributable forests of the Nord-du-Québec region will be fully covered by an Access Road Management Plan.

Preparation of the Access Road Management Plan will be organized around the values of the public and MFFP partners. For the moment, the development values and objectives relating to the forest road network have been identified from discussions from TLGIRTs, consultation and harmonization meetings (Table 18).

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

Table 18 :Environmental values from regional partners that are associated with the access road network and management objectives linked to these values

Values	General Management Objectives
Public safety	A forest road network ensures an acceptable level of public safety.
Fish habitat	A forest road network in which watercourse crossings do not hinder the free circulation of fish.
Protection of spawning grounds	Planning sufficiently in advance to allow for consultation and field verification.
Water quality	A forest road network that limits erosion and sedimentation events.

Values	General Management Objectives
Maintaining the woodland caribou habitat	A forest road network with limited range in the woodland caribou habitat, limiting habitat fragmentation and the rate of disturbance.
Traditional way of life	A forest road network that favours accomplishment of the traditional way of life.
Optimal access	A forest road network that ensures accessibility of the region's various activities without presenting redundancy.
Economic development	A forest road network that promotes forestry, mining, energy, hunting, fishing, trapping and ATV activities and harvesting of non-timber forest products (PFNL).
Predictability of operations	Knowing future harvesting operations in the medium term (5 years) in order to invest where the return on investment will be possible.
Visual quality of landscapes	A forest road network which maintains the visual quality of the landscape for hiking, canoeing or other uses.

A detailed action plan has been drafted to clarify the approach that the MFFP will follow for preparation and implementation of its Access Road Management Plan. The key actions of the approach are:

- Identification of the basic network, access roads necessary to maintain land rights (resorts, occupation of the territory) and the economic activity related to natural resources (forestry, energy, mining, NTFP);
- Clarification of concerns related to the preliminary basic network via TLGIRTs;
- Identification of areas related to the territory's values and association of the specific management objective of the road network;
- Presentation of areas and their management objectives specific to the TLGIRTs for raising concerns;
- Identification of opportunities for road closures and scenarios for opening after closing to limit expansion of the network;
- presentation of potential closing projects to the TLGIRTs;
- Each closing project will then follow the normal process provided in the Guide for Multi-Use Road Closure Requests.

For the moment, the action plan does not address road maintenance. This element may be explored in a 2nd phase, if necessary.

8.1.7. Analysis of management plans by the staff of the Direction de la gestion de la faune

All operational management plans are analyzed by wildlife biologists and technicians of the Direction de la gestion de la faune. This can detect potential impacts on the habitats of wildlife species and adapt planning as needed. This approach is an additional safety net to preserve biodiversity in managed areas.

8.1.8. Natural disturbance recovery strategy

To ensure the maintenance of naturally disturbed forest attributes, an ecosystem burn recovery strategy was developed at the provincial level. The main directions of this strategy are:

- maintenance of 30% on average of the area burned;
- conservation of representative burned stands;
- conservation of fire-free forests (unburned);
- well distributed residual forest of varied form;
- soil and water protection.

The same kind of rules apply for the recovery from total windfall or insect epidemics.

Sources:
MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS (2017). Integration of ecological issues into the 2018-2023 integrated forest management plans, Book 5.1 – Issues related to attributes of internal structure of stands and deadwood. Direction de l'aménagement et de l'environnement forestiers, Gouvernement du Québec, 66 p.

NAPPI, A. AND OTHERS (2011). Harvesting in burned forests – Issues and guidelines for ecosystem management. Ministère des Ressources naturelles et de la Faune, Direction de l'environnement et de la protection des forêts, Gouvernement du Québec, 51 p.

8.1.9. Protected areas and biological refuges

Protected areas, biological refuges and exceptional forest ecosystems on the territory contribute to protection of old-growth forests and also limit forest harvesting on the territory. Areas that are not yet old-growth will have the opportunity to age and increase the proportion of old-growth forests in the territory.

8.1.10. Management of riparian environments

An analysis of the different types of management applied to riparian environments in the region is underway. This involves, among other things, identification of riparian environments, calculation of the percentage of their surface area where distinct conditions are applied and identification of importance criteria as wildlife and plant habitat.

8.1.11. Sound forestry practices

Forestry operations carried out respecting the Sustainable forest management rules (RADF, https://mffp.gouv.qc.ca/RADF/guide/?lang=en) and sound forestry practices help reduce the impacts on the ecosystems. The standards are particularly focused on protection of the aquatic ecosystem and the fish habitat.

8.1.12. Visual quality of landscapes

Regarding the visual aspect, Chapter II of the Sustainable forest management rules provides for protection if particular places and territories. For example, protection stipulated by this regulation translates into a wooded edge left around an open air base with the addition of a visual surround within three kilometres of view all around. For more information, consult the guide: https://mffp.gouv.qc.ca/RADF/guide/chapter-ii/?lang=en. Depending on the will of the community, certain TLGIRTs can propose conditions that go beyond the protections of the RADF.

Where a TLGIRT wishes to provide a sector type with more stringent conditions, an approach similar to the following could be initiated:

1) To start by an exercise of determination of the level of sensitivity of lakes and/or sites of major interest based on criteria such as the *quantity of users, duration of use, duration of observation and diversity of services offered*, for example. As a reference, a working method that has already been proven in other TLGIRTs in Québec is available online at: https://www.mffp.gouv.qc.ca/publications/forets/consultation/outil-decision.pdf. English version can be provided on request.

2) To conduce a geometric analysis using a spatial analysis tool that allows identification of visible stands from selected lakes or sites of interest. The MFFP could, on request, provide geomatics support to the TLGIRTs that have taken the first step.

3) At the end of step 2, the TLGIRT and the MFFP should be able to agree on draft conditions to be included in the PAFIT. Depending on their impact on the Annual Allowable Cut (AAC or *possibilité forestière* in French), its application will be conditional on the approval of the MFFP authorities.

8.1.13. Reports of habitats or species of interest

Land users are invited to report habitats or species of interest to the MFFP. The reports will be verified and incorporated into official layers where applicable.

Regarding reports of spawning grounds in particular, a new issue-solution fact sheet has been created (3.02.2). The aim is to make sure the reports are in fact submitted and the applicable rules are applied while awaiting confirmation of the spawning ground. A monitoring indicator has been developed to follow up on this process.

8.2. Issue-Solution Fact Sheets

The above information can be found in the issue-solution fact sheets,[9] which give detailed explanations of each issue and the associated objectives, indicators and targets if any. They also set out the solutions identified to achieve the objectives. A review of the results obtained is also included for every indicator for which results are available. The following table contains a list of Issue-Solution Fact Sheets for this tactical plan. The sheets are presented in the additional tactical plan document entitled *Fiches enjeux-solutions pour la region Nord-du-Québec*.

Table 19 : List of Issues-Solutions fact sheets for the for the MU of the PAFIT

No	Enjeu (valeur)	No	Objectif
1.01	Changes in forest composition	1.01.1	Minimizing gap between managed and natural forests - To limit hardwood expansion
		1.01.2	Maintaining habitats associated with mixedwood stands
		1.01.3	Maintaining or increasing white spruce abundance
1.02	Irregular old-growth forest	1.02.1	Maintaining sufficient old-growth stands with irregular structure
1.03	Biological legacies in clearcuts	1.03.1	Minimizing gap between managed and natural forests - deadwood rarefaction
1.04	Young forest structure and composition	1.04.1	Limiting internal structure simplification in young second-growth stands
1.05	Naturally-disturbed forest attributes	1.05.1	Maintaining attributes specific to forests naturally disturbed at the landscape scale and in areas affected by special management plans
1.06	Spatial organization of forests	1.06.1	Implementing a spatial repartition pattern inspired by natural forest
1.07	Sensitive species	1.07.1	Considering sensitive species habitat needs in forest management
		1.07.2	Contributing to woodland caribou recovery by applying forest management modalities that maintain suitable habitat
1.08	Ecological functions fulfilled by wetlands and riparian areas Forest age structure	1.08.1	Protecting wetlands
		1.08.2	Diversifying management of riparian environments
1.09	Forest productivity and sustainability	1.09.1	Minimizing gap between managed and natural forests - forest age structure
2.01	Ecological functions fulfilled by wetlands and riparian areas	2.01.1	Maintaining the productivity of forest ecosystems susceptible to ericaceous invasion
		2.01.2	Maintaining the productivity of forest ecosystems susceptible to paludification
3.02	Water quality and aquatic ecosystem integrity	3.02.2	Protecting fish habitat, especially spawning grounds

Although some objectives are extremely important, they do not all have associated indicators and targets. This is due to the fact that some objectives are also core aspects of the tactical plan and are monitored using management strategy monitoring indicators or other processes. In other cases, indicators and targets may not yet have been developed for the objectives concerned. This is the case for certain wildlife-related issues that are currently being processed (e.g. objective 1.07.1).

Several objectives are assigned follow-up indicators. Table 20 sets out all the indicators and targets for each MU covered by the tactical plan.

[9] Also known as VOIC fact sheets.

Table 20 : Summary table of VOIT for the MU or MU group of the PAFIT (R17)

No	Objective	No	Indicator	Indicator type	Target	Deviation	MU	Initial state	Units
1.01.1	Minimizing gap between managed and natural forests - To limit hardwood expansion	1.01.1.A	Gap between the current and historical proportion of mixedwood and hardwood stands.	Status indicator	Maintaining the current proportions of hardwood stands.	± 5% from historical level	086-52	8	%
		1.01.1.B	Ratio of the area covered by silvicultural treatments limiting hardwood expansion on harvested area susceptible to hardwood expansion.	Performance indicator	60%	None.	086-52	135	%
1.02.1	Maintaining sufficient old-growth stands with irregular structure	1.02.1.A	Ratio of the percentage of current and historical proportion of old-growth irregular stands.	Status indicator	Between 30% and 50%.	The acceptable deviation is included in the target, which is a range (30% to 50%) of the reference status.	086-52	10	%
		1.02.1.B	Ratio of the area covered by irregular shelterwood compared to the whole harvested area in the FMU.	Performance indicator	5%	Vary the application of irregular shelterwood cuts between management units while maintaining the 5% for the local office integration zone.	086-52	10	%
1.03.1	Minimizing gap between managed and natural forests - deadwood rarefaction	1.03.1.A	Ratio of the area covered by variable retention compared to regeneration cutting area.	Performance indicator	40%	None.	086-52	39	%
		1.03.1.B	Proportion of COS or traplines whose ratio of the area covered by variable retention compared to regeneration cutting area is equal or over 40%.	Performance indicator	100% of the compartments	None.	086-52	59	%
1.04.1	Limiting internal structure simplification in young second-growth stands	1.04.1.A	Proportion of hexagons whose ratio of the area covered by tending treatmentsfor the last 5 years (precommercial thinning and clearing) compared to the area of young stands (10 to 25 years of age) is less than or equal to 50%.	Performance indicator	100%	If units exceed 50%, mitigation measures should be considered.	086-52	98,1	%

No	Objective	No	Indicator	Indicator type	Target	Deviation	MU	Initial state	Units
1.07.2	Contributing to woodland caribou recovery by applying forest management modalities that maintain suitable habitat	1.07.2.A	Rate of compliance with the modalities planned for woodland caribou habitat.	Performance indicator	100%	None	086-52	100	%
1.08.1	Protecting wetlands	1.08.1.A	Ratio of protected wetlands compared to the FMU area.	Performance indicator	1% of the MU territory, in addition to protected areas (up to 12% of protected wetlands).	None	086-52	35112	ha
1.09.1	Minimizing gap between managed and natural forests - forest age structure	1.09.1.A	Percentage of the territory where the forest age structure has a low or moderate degree of alteration compared to historical natural forest.	Performance indicator	100% of the UTA	None	086-52	58	%
2.01.1	Maintaining the productivity of forest ecosystems susceptible to ericaceous invasion	2.01.1.A	Ratio of the area covered by silvicultural treatments limiting ericaceous shrubs expansion on harvested area susceptible to ericaceous shrubs expansion.	Performance indicator	60%	None	086-52	(vide)	%
2.01.2	Maintaining the productivity of forest ecosystems susceptible to paludification	2.01.2.A	Ratio of harvested paludified stands (or stands susceptible to paludification) that have undergone forestry operations adapted to paludification in accordance with the regional strategy.	Performance indicator	70 %	None	086-52	(vide)	%
3.02.2	Protecting fish habitat, especially spawning grounds	3.02.2.A	Ratio of the reported spawning sites that were submitted to the validation process and temporary protected.	Performance indicator	100% of the spawning sites reported	None	086-52	(vide)	%

8.3. Economic analysis

When investing, the MFFP seeks to ensure forest regeneration as well as yield sustainability or improvement in order to attain the best possible economic return. Economic and financial assessment tools and processes are made available to forest managers to enable them to select silviculture scenarios that meet economic objectives best and take environmental and social objectives into account. These tools and processes facilitate decision-making when elaborating a strategy to attain optimal management in regard to economic profits generated for society as a whole.

Economic profitability analyses aim to measure the economic profitability of a specific investment from a societal perspective. They take into consideration the revenues and costs of all economic agents in society regardless of who pays and who receives. Economic profitability analyses evaluate if public investments create maximum wellness and material wealth with limited financial, human and physical resources.

For this PAFIT, the economic profitability analysis of individual silviculture scenarios developed for all groups of strata at MU scale is still ongoing. To support the evaluation of annual allowable cuts, the Chief Forester Office (FCO) conducted a number of sensitivity analyses putting to the test scenarios involving various gradients of silviculture intensity. This type of analysis is complementary to the economic assessment of individual silviculture scenarios. It is possible that a silviculture scenario records negative economic profitability but is nevertheless included in the management strategy for the purposes of attaining more general objectives such as biodiversity preservation and wood flows over time.

Developments are still ongoing; the analyses, although partial, are relevant enough to document our choices. The economic profitability analysis of forest management strategies conducted to shift forestry investments towards more profitable choices of scenarios will be enhanced steadily. More information on the fundamentals, inputs and limits of the economic profitability analysis are provided in Appendix G.

The tool used to conduct economic analyses is called Modèle d'évaluation de la rentabilité des investissements sylvicoles (MERIS) which is a forest Investment profitability assessment model. This model uses silviculture scenarios to measure economic benefits from timber production and processing. MERIS is provided by the MFFP's Bureau de mise en marché des bois (timber marketing board), known as BMMB, at the following address: https://bmmb.gouv.qc.ca/analyses-economiques/outils-d-analyse/

Scale of analysis conducted for the PAFIT

The scale of analysis used for the PAFIT corresponds to the group of strata (a grouping of similar strata to which the same forestry scenarios may apply). The groups of strata identified for this purpose are most important in terms of representativeness according to the model used by the Chief Forester Office, (Bureau du Forestier en chef known as BFEC), to determine annual allowable cuts in each MU for the period of 2013-2018. The groups of strata selected for conducting the analysis account for more than 85% of the surface areas of MUs in the region.

Using groups of strata and yields associated with the treatments considered in the calculation of annual allowable cuts makes it possible to produce stand evolution curves, also referred to as "treatment effect curves"; with these curves, it is possible to assess the baskets of timber products generated by each harvest activity foreseen in a given scenario.

Net economic profitability

Net economic profitability considers that forests can generate value without human intervention. In economic profitability analyses, this element is captured in the differential with a reference scenario. This value must be accounted for in the economic profitability analysis to measure additional wealth from an investment. These characteristics are of major significance when assessing the economic profitability of public investments, for the State must seek to create maximum wellness and wealth with limited financial, human and physical resources.

Costs represent the sum of all costs generated by silvicultural operations (planning, execution and monitoring) for the duration of a sylviculture scenario. Revenues include royalty, corporate profit, salary income, physical capital income, extra income for timber quality and quantity, and effect on the calculation of annual allowable cuts.

8.3.1 Results of the economic profitability analysis

The economic profitability analysis of the various silviculture scenarios developed for this PAFIT is still ongoing; it will be incorporated in the 2023-2028 PAFIT.

It should be noted, however, that several factors are likely to influence economic profitability analysis results. It appears that the most important factor of all is the relation between the levels of investment and the value of harvested products. Other factors, including rotation and time interval between interventions and potential vegetation, may also affect the results.

The estimate of forest yields and years of intervention for reforestation and tree planting scenarios come from plantation yield tables: EPB (Prégent et al. (2010)[10]), EPN (Prégent et al. (1996) – modified in 2013[11]) and jack pine (Bolghari and Bertrand (1984)[12][13]).

Implementation

An action plan is currently being implemented at provincial level to improve and orient the process towards completion of the economic analysis by 2020. Following are avenues being considered for improving the process for reviewing the method, hypotheses and interpretation of results:

1- Reviewing the parameters of the silviculture scenarios and the hypotheses of calculation.

2- Evaluating and capturing the effects of major treatments not captured at the present time.

3- Incorporating the notion of stem quality by using intervention inventory data rather than growth charts.

4- Adjusting MERIS tool to better manage the value and utilization rate of products.

5- Conducting sensitivity analyses.

6- Analyzing the effects on annual allowable cut calculations.

When the analyses get more robust, their results will be used for reviewing and adapting silviculture strategies and levels of forestry development in preparation for the next calculations of annual allowable cuts.

8.4. Regional timber production strategy

Following the Rendez-vous de la forêt québécoise (November 2013) and the Chantier sur la production de bois, the MFFP committed to develop a timber production strategy via the Sustainable Forest Management Strategy.

The main purpose of a timber production strategy consists in facilitating decision-making related to forestry investments to maximize wealth generation from wood. Making investment decisions must be based on market needs, but also respect other forest uses and functions and adhere to principles of sustainable forest management[65].

[65] MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS (2016b). Guide d'élaboration d'une stratégie de production de bois régionale – Étapes A et B, version 1.0, Québec, Gouvernement du Québec, Direction de l'aménagement et de l'environnement forestiers, 25 p. [Published in the MFFP's SharePoint site].

The three guidelines underlying forestry development choices and silviculture interventions to generate wealth from timber resources are as follows: 1) aiming at economic profitability of forestry investments; 2) ensuring optimum diversity for long-term strategy robustness; and 3) focusing on solid values.

The Direction de la gestion des forêts du Nord-du-Québec is currently developing a timber production strategy, in which several timber production options will be studied: intensive silvicultural operations in plantations – including high yield wood production areas (AIPL) – or regeneration of stands affected by paludification.

While the regional strategy for timber production is not completed yet, several actions it proposes will be presented partially in this PAFIT.

In this PAFIT, the elements of the regional strategy on timber production include: selection of top-valued tree species; production objectives; silvicultural treatment

[10] PREGENT et coll. (2010).
[11] PREGENT et coll. (1996).
[12] BOLGHARI and BERTRAND (1984).
[13] Empty boxes mean that the analyses have not been completed.

alternatives; and economic analyses on said alternatives. Areas for intensive forest management and practical examples of timber production-focused actions are also covered in the section on timber production strategy.

8.4.1. Regional top-valued tree species

Determining top-valued tree species is key to developing timber production strategies, for it enables to identify species that offer solid value. To facilitate the selection process, a global appreciation of all tree species found in the region was conducted in line with the following criteria:

1- Availability of each species (volume of standing timber, history of annual allowable cuts, timber supply allocations and guarantees)

2- Biophysical potential (see section on AIPL)

3- Industrial demand and consumption (mill requirements and harvest)

4- Vulnerability to risks associated with climate change, insects and diseases

5- Value of products derived from each species

6- Management efforts for each species and respective success rates

The other species are classified in three (3) categories: species to be promoted; species considered acceptable; species requiring control[14].

It is possible that a given tree species be classified in more than one category, depending on the site or management objectives.

Practical actions, done or foreseen, to promote top-valued species include:

1- Planting yearly a variety of seedlings: spruce, jack pine, white spruce.

2- Adapting specifications relating to tending operations to favor spruce over fir.

3- Identifying potential commercial thinning sites.

Species (Top-valued, to be promoted, considered acceptable, requiring control)	
Black spruce (EPN) *White spruce (EPB)* *Jack pine (PIG)*	**Top-valued species** Based on aforementioned criteria, species for which production objectives are identified and production efforts focused on higher yields.
Black spruce (EPN) *White spruce (EPB)* *Jack pine (PIG)*	**Species to be promoted** Species for which we wish to increase the ratio in stands through silvicultural treatments. Scenarios can be extensive, basic or intensive in nature.
Jack pine (PIG) *Balsam fir (SAB)* *Paper birch (BOP)* *Poplar (PEU)* *Tamarack (MEL)*	**Species considered acceptable** Acceptable species are not subject to silvicultural treatments to change their ratio in a given stand or site, because they do not interfere in the optimum development of species to be promoted. Silviculture scenarios for managing these species will be chiefly extensive or basic in nature.
Paper birch (BOP) *Poplar (PEU)*	**Species requiring control** We refer here to species for which we wish to reduce the ratio in stands through silvicultural treatments; they are not associated with any production objectives.

8.4.2. Timber production objectives and silvicultural options

Production objectives are meant to address in part the issues listed in section 8 of the previous chapter. Each objective applies to one or many specific top-valued species. Promoting these species calls for the implementation of concrete actions foreseen in silviculture scenarios. The following tables lists production objectives, their respective top-valued species, and the silvicultural options selected to attain them. These options are an integral part of the silviculture strategy presented in section 8.6.

[14] *Forestry glossary (French only) available at: http://glossaire-forestier.mffp.gouv.qc.ca/*

Table 21 : Timber production objectives

Objectives	Species to be promoted	Selected silvicultural treatments
Maintaining or increasing production of target species	EPX	- Commercial cuts (natural regeneration) - Tending
		- Planting, reforestation and fill planting
	PIG	- Commercial cuts (natural regeneration) and tree planting
	PEU	- Commercial cuts (natural regeneration)
Increasing volume per stem	EPX	- Intensive planting
	PIG	
↑ average diameter/stem	EPX	- Intensive planting
	PIG	
↑ quality of wood fiber ↑ average diameter/stem	PEU	- Commercial cuts (natural regeneration): harvest of 70- to 80-year old timber; sharing and selection of optimal length timber

8.4.2.1. Indicators and targets related to timber production challenges

Elaborating regional timber production strategies involves establishing a number of indicators and targets based on stakeholders' needs and expectations to maximize the strategy's overall performance at implementation phase.

To move to this step, impact and sensitivity analyses must be conducted with the Chief Forester in order to properly target work completion rates aiming at addressing each timber production issue.

8.4.3. High yield wood production areas

Concept

One way to increase the production of target species and high-quality lumber is to devote parts of the forest land to intensification of wood production. These areas, called high yield wood production areas (AIPL), must ultimately be quantified and localized in an integrated forest management plan (PAFI).

G. Pilote (see reference below) defines an AIPL as a land essentially meant for production of wood where silvicultural operations focus on value increase per area unit. Value increase can result in an increase in volume per area unit, stem volume or stem quality; in the production of preferred species; or in a combination of these production objectives.

PILOTE, G. (2016). Procédure d'enregistrement des aires d'intensification de la production ligneuse, Québec, gouvernement du Québec, ministère des Forêts, de la Faune et des Parcs, Direction de l'aménagement et de l'environnement forestiers, 19 p.

Generally speaking, areas designated for production of wood material must have a certain growth potential, show a low level of operational constraint and be easily accessible. Public and Aboriginal consultations were conducted in the spring of 2019 on the location of those areas.

Past operations will be taken into consideration if the sites concerned meet the desirable characteristics and have a good growth potential.

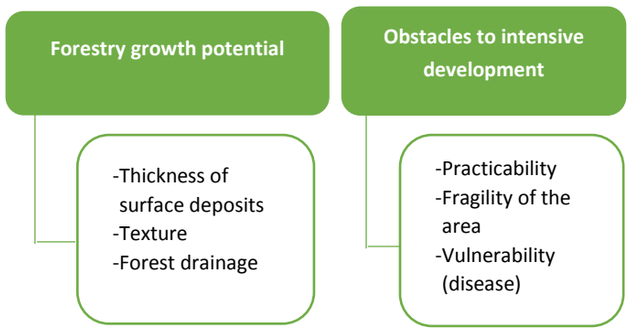
The process toward the implementation of AIPLs is presented in schedule ; the first step is described as follows.

8.4.3.1 Identification of forest growth potential by cartographic means

The forests found in the management units of the region have a good potential for timber production intensification. In this context, the first step consists in identifying surface areas offering the best opportunities for intensive silvicultural operations.

To this end, their growth potential must be above average and show a low level of operational constraints.

A biophysical model is being developed for identifying forest potential by cartographic means. The model is based on characteristics specific to the sites: forest growth potential and intensive management constraints.



The result is a map of raw information on forest potential at individual forest polygon level.

The result is a rough map presenting the forest potential at the scale of each ecoforest polygon.

Areas not subject to forest management as well as certain management techniques without any intervention are removed from the map.

The maps can be consulted at the following address: https://operationsregionales.mffp.gouv.qc.ca/APPLICATIONSWEB/R10/015_CI_00fevrier_00fevrier_2019_tlgirt

8.5. Silvicultural scenarios

Silvicultural scenarios and treatments selected are generally intended to promote natural regeneration which will evolve without further intervention. This work consists of protecting pre-established regeneration at the time of harvesting, or creating adequate germination beds. Tree planting and in-filling are generally used when natural regeneration is insufficient or when the regeneration present is not part of the intended composition. Subsequent forestry efforts are intended to favour the species to be promoted and to manage the species to be controlled, without recourse to herbicides and respecting the site's ecology. The silvicultural scenarios selected are presented below.

8.5.1. Gradient in silviculture intensity

The gradient in silviculture intensity allows for the implementation of silviculture scenarios and treatments according to the efforts required to carry them out, such as the number of interventions for tending a forest stand or the required level of silviculture investments. Silviculture scenarios are evaluated by considering global intervention profitability and expected timber production. These evaluations are one of the many inputs that guide forest engineers in their decisions.

The gradient in silviculture intensity applied at regional scale is composed of three (3) levels of silviculture: extensive, basic and intensive. Following is a short description of these levels:

- Extensive silviculture: Stand improvement is achieved exclusively via natural regeneration, using clear-cutting and seed-tree cutting regeneration methods (régénération par coupe totale et par coupe avec réserve de semenciers). This involves protecting advanced regeneration or fostering the establishment of regeneration via natural seeding on adequate seedbeds created during harvest operations or land preparation work.
- Basic silviculture: All interventions are geared towards stand composition management. To increase the yield of preferred species, competing species must be controlled (via clearing, cleaning, shelterwood felling and other means); tree planting may also be required. Sanitation cutting can help improve the health condition of the stand.
- Intensive silviculture: The purpose of intensive silviculture interventions is to increase the growth and quality of selected specimens of preferred species. Rotations are short and predetermined. Several interventions are spread out in time, thus allowing to select and support the best trees. Intensive silviculture differs from basic silviculture by the management of intraspecific competition (e.g.: regular spacing between future crop trees of the same species during pre-commercial and commercial thinning operations).

Extensive and basic silviculture are applied on the majority of the territory, while intensive silviculture, which over time requires more interventions, is only applied where it's profitable.

8.5.2. Silvicultural treatments

The preferred silvicultural treatments apply to the high forest regime; they are divided into two (2) types of age structure: regular and irregular.

The regular structure is characterized by the presence of trees, similar in size, whose age can be grouped as one category. The other structures, classified as irregular, are characterized by the presence of trees that can be grouped in two (2) to four (4) age categories. In general, this structure can be controlled through a series of partial cuts spaced out over time.

For more details on these concepts, refer to the Guide sylvicole du Québec, tome 2, part 1.

Silvicultural treatments can be grouped in four (4) categories, according to the intervention's main silvicultural objective:

Table 22 : Categories of silvicultural treatments

Treatment category	Description	Examples
Regeneration processes	Treatment or sequence of silvicultural treatments intended to create or release a regeneration cohort.	• Cutting with protection of regeneration and soils (CPRS); • Cutting with variable retention; • Cutting with seed bank; • Regular shelterwood.
Site treatment	Silvicultural treatment applied to the soil to improve conditions for establishment and growth or the vitality of trees.	• Site preparation; • Soil modification.
Artificial regeneration treatment	Silvicultural treatment aimed at creating a regeneration cohort by artificial seeding or planting.	• Tree planting; • In-filling; • Artificial seeding.
Forest stands tending treatment	Silvicultural treatment applied to trees to improve their growth, quality or vitality.	• Clearing; • Cleaning; • Pre-commercial thinning; • Commercial thinning; • Pruning.

The silviculture scenarios and treatments selected have for primary purpose forest management and renewal by protecting advanced natural regeneration or creating conditions conducive to the establishment of natural regeneration. Tree planting and infilling are methods used when species to be promoted or preferred species do not regenerate well naturally or the time required for the establishment of regeneration is too long. Subsequent silviculture efforts aim to support the growth of species to be promoted or preferred species and to manage species requiring control without pesticide application. In many cases, the operations will help meet several challenges, including age structure, other usages and depletion of certain tree species.

Table 23 (Description of silvicultural treatments) summarizes the regional silviculture strategy.

Table 23 : Description of silvicultural treatments

Commercial treatments Regeneration cutting – Large cutting	Objectives and effects
Cutting with protection of regeneration and soils (CPRS)	This type of cut is the most used in Québec. Since the trees are all practically the same age and the species, they are harvested at the same time. The movement of machinery disturbs less than 25% of the soil of the total harvested area. This cut promotes regeneration by protecting the forest soil and the naturally occurring young trees. If they do not cover the whole territory, the remainder is filled by tree planting.
Cutting with protection of high regeneration and soils (CPHRS)	This type of cutting also promotes the natural growth and regeneration of the forest. What differentiates it from CPRS is the special protection applied to high regeneration. These are young trees that are larger than small seedlings, but which have not yet reached commercial dimensions.
Cutting with protection of small merchantable stems (CPPTM)	This type of cutting reduces visual impacts while allowing for harvesting of a good volume of timber. What differentiates it from CPHRS is the special protection applied to trees deemed to be merchantable. These are young trees that have reached commercial dimensions, but which are not cut right away. This cutting allows the forest to reach old-growth forest characteristics more quickly than if all the trees were harvested at the same time, as in a CPRS for example.
Commercial treatments – Regeneration cutting Variable retention cutting	**Objectives and effects**
Cutting with protection of regeneration and soils with retention by clumps, islets or stems (CPRSRBOU-CPRSILOT-CPRSTIGE)	This type of cutting preserves 5% to 10% of the standing forest in the form of well-distributed small clumps and islets. These clumps can have varying dimensions depending on the species present and the size of the cut. This is for maintaining small habitats for certain plants and various vegetation such as lichens and fungi. These clumps of trees left in the forest allow conditions to be reached closer to those of a naturally disturbed forest.
Commercial treatments – Partial cutting	**Objectives and effects**
Regular and irregular shelterwood (CPR-CPI)	This type of cut is a series of partial cuts intended to ensure there is a new generation of young trees after each of them. By creating different age classes in this forest and trees with a variety of sizes, a natural form of forest is approached more, which is becoming increasingly rare. From 30% to 50% of the timber is cut. This cutting is also more pleasing to the eye with continuous forest cover. What differentiates the two types is that the series of regular cuts is done over a shorter period.
Commercial thinning (EC)	This type of cutting is intended to harvest a portion of the trees to accelerate the growth of those remaining. The goal is to obtain larger and better quality trees when the time comes to harvest them.

Cropping treatments for returning to production (non-commercial)	
Site preparation: The following treatments are intended to create sites where plants will have good conditions to grow, i.e., enough water, light and food. The same applies to allow seeds to germinate well. Mineral soil is a soil skeleton. It consists of sand, silt or clay and is produced by degradation of the bedrock. Organic soil is produced by living material (animals, plants, fungi, etc.). It is created from life and its decomposition.	
Cropping treatments for returning to production (non-commercial)	**Objectives and effects**
Furrow scarifying	This treatment consists of working the soil by forming furrows (long open trenches in the ground). It serves to mix the mineral soil with the organic soil for tree planting. This type of scarifying is done when there is little woody debris on the ground. It also limits the appearance of competing vegetation which interferes with the growth of young plants by consuming the same elements as them (water, nutrients and light).
Cropping treatments for returning to production (non-commercial)	**Objectives and effects**
Spot scarifying	This treatment consists of stirring the organic soil layer and woody debris using an excavator equipped with a comb. It creates good sites for seeds, of yellow birch for example, to germinate well. Tree planting can also be done. Unlike furrows, this scarifying can be used when there is debris on the ground, when there are still trees standing and when the terrain is difficult (slopes, rocks, etc.).
Cropping treatments for returning to production (non-commercial)	**Objectives and effects**
Harrowing	This treatment consists of completely ploughing the soil by mixing the organic material with the mineral soil using a forest harrow. Once again, this creates sites that provide good growing conditions for future plants. Vegetation that interferes with young plants is also eliminated when the machinery passes.
Winter clearing	Winter clearing consists of moving or packing unwanted vegetation (trees, branches, etc.) to form piles in rows. A small portion of organic soil is removed when the machinery passes to allow young plants that will be planted to grow better. This treatment is done in winter on sites where there are no large rocks. During clearing, the piles appear tall and wide, but this is mainly due to snow. The next summer, the site is ready for planting young plants between the piles.

Cropping treatments for returning to production (non-commercial)	Objectives and effects
Tree planting: Tree planting or reforestation is the planting of small trees in good sites. These plants are of a variety of species (spruce, pine, etc.) and may have different dimensions. They have all been raised in a nursery.	
Planting and infilling	Planting takes place when small plants already naturally in place on the site are of poor quality or insufficient quantity. The goal of planting is ensure the return of the forest. It is also necessary to ensure the return of the species that were present there before cutting. In-filling is only done in certain places. It is intended to fill in a lack of plants on trails, gaps or after planting where small trees have died.
Cropping treatments for regenerated stands (non-commercial)	**Objectives and effects**
Mechanical clearing	The purpose of this treatment is to eliminate species that compete with young plants to allow them to grow better. So there is no more competition for the sun, water and soil nutrients. Clearing is done with a brushcutter. It is carried out in the first five years following tree planting.
Cleaning	This treatment is substantially the same as clearing. However, it is done seven to fifteen years after tree planting, so after clearing. It can also be practised in naturally regenerated forest to reduce the presence of certain unwanted species that harm others. It lets trees continue their growth in good conditions.
Pre-commercial thinning	This treatment also consists of cutting trees which harm the growth of other trees. There comes a time when some of them need more space to expand. So only selected trees are thinned. Pre-commercial thinning is done seven to fifteen years after cutting. At maturity, these trees will have a more interesting diameter (size) thanks to the thinning.

8.5.3. Silvicultural scenarios selected

The scenarios presented below are those used to generate the Annual Allowable Cut (AAC or *possibilité forestière* in French) in effect for the 2018-2023 period. The next scenarios related to the 2023-2028 period are currently being developed.

Table 24 : Silvicultural scenarios selected (R15) for MU 086-52

	Type of forest cover	Hardwood			Mixed with a dominance of hardwood									Mixed with a dominance of softwood																	
	Forest station group	RFiF		RFiM	RFiF					RFiM				RESR0	RFiF											RFiM					
	Forest types	BpFx	PeFx		BpRx			PeRx		BpRx			PeRx	EpFx						PgFx	SbFx				EpFx			PgFx			SbFx		
Sylvicultural intensity gradient	Essence to promote/Silvicultural	BpFx	PeFx	PeFx	BpFx	SbFx	BpRx	PeRx	SbFx	BpRx	EpFx	EpFx	PeRx	EpFx	Ep	Epb	EpFx	EpRx	SbFx	Ep	Ep	Epb	SbFx	SbRx	Ep	EpFx	EpRx	Ep	EpFx	EpRx	Ep	SbFx	SbRx
Intensive	(EPC)-EC-CPRS																															
Intensive	SCA-PLi-DEG-EC-CPRS															X[15]				X[15]		X[15]			X[15]			X[15]			X[15]		
Intensive	SCA-PLi-EC-CPRS																															
Basic	CPIL-CT																X									X						
Basic	NET-CPRS					X			X			X						X						X			X			X		X
Basic	SCA-PLb-CPRS																															
Basic	SCA-PLb-DEG-CPRS														X[15]						X				X[15]								
Basic	SCA-REG-CPRS																															
Basic	SCA-REG-NET-CPRS										X																					
Extensive	CPRS	X	X	X	X		X	X		X			X	X					X				X			X			X			

[15] Over the Paix des Braves territory, silvicultural scenarios that promote only a softwood species but whose forest station naturally allows for the establishment of mixed stands will be subject to a particular management strategy for mixed stands (ENRQC, chap. 3, Annex C-3, Section C). Indeed, this strategy is under development and minimum thresholds of mixed stands 60 years and over are applied at the level of each of the trapping areas. Thus, in certain traplines, certain scenarios that promote only a softwood species will be capped in favor of scenarios that promote a mixed composition.

	Type of forest cover	Softwood																																	
	Forest station group	RESR							RESR0			RESR1	RESRH				RESRL	RFiF																	
	Forest types	Ep	EpRx		Pg		PgRx		Ep	EpRx	PgRx		Ep	EpRx		SbRx		PgRx	Ep	EpRx		Pg		PgRx		Sb			SbRx			
Sylvicultural intensity gradient	Essence to promote/Silvicultural	Ep	Ep	EpRx	Ep	Pg	Ep	Pg	Ep	Ep	Ep	Pg	Ep	Ep	EpRx	Ep	EpRx	Ep	Ep	Ep	EpRx	Ep	Pg	Ep	Pg	Ep	Epb	SbRx	Ep	Epb	EpRx	SbRx
Intensive	(EPC)-EC-CPRS																																		
Intensive	SCA-PLi-DEG-EC-CPRS																		X	X			X		X		X			X					
Intensive	SCA-PLi-EC-CPRS																																		
Basic	CPIL-CT	X		X															X		X														
Basic	NET-CPRS																																	X	
Basic	SCA-PLb-CPRS	X	X			X		X				X	X[16]	X[16]		X[16]																			
Basic	SCA-PLb-DEG-CPRS																		X	X			X		X	X			X					
Basic	SCA-REG-CPRS																		X																
Basic	SCA-REG-NET-CPRS																			X															
Extensive	CPRS	X	X		X		X		X	X	X		X		X		X	X	X	X		X		X			X					X			X

[16] Given the very high cost of work and uncertain silvicultural results, tree planting on paludified or susceptible to paludification sites will be limited notably to accessible areas and those judged with the best potential for success. Reflections are still underway on the long-term viability of forest management on these sites and the best conditions for intervention where appropriate.

	Type of forest cover	Softwood										
	Forest station group	RFiM										
	Forest types	Ep	EpRx		Pg		PgRx		Sb		SbRx	
Sylvicultural intensity gradient	Essence to promote/Silvicultural	Ep	Ep	EpRx	Ep	Pg	Ep	Pg	EpRx	SbRx	EpRx	SbRx
Intensive	(EPC)-EC-CPRS	X		X		X						
Intensive	SCA-PLi-DEG-EC-CPRS	X	X			X		X				
Intensive	SCA-PLi-EC-CPRS											
Basic	CPIL-CT	X		X								
Basic	NET-CPRS								X		X	
Basic	SCA-PLb-CPRS	X	X			X		X				
Basic	SCA-PLb-DEG-CPRS											
Basic	SCA-REG-CPRS											
Basic	SCA-REG-NET-CPRS											
Extensive	CPRS	X		X	X		X			X		X

Forest station group	Potential vegetation	Designation
RES_R	RS2	Sapinière à épinette noire
	RE2	Pessière noire à mousses ou à éricacées
RES_R0	MS2	Sapinière à bouleau blanc
	RE2	Pessière noire à mousses ou à éricacées
	RE1	Pessière noire à lichens
	RS2	Sapinière à épinette noire

Forest station group	Potential vegetation	Designation
RES_RH	RS3	Sapinière à épinette noire et sphaignes
	RE3	Pessière noire à sphaignes
RES_RL	RE1	Pessière noire à lichens
RFi_F	ME1	Pessière noire à peuplier faux-tremble mésique ou subhydrique
	MS2	Sapinière à bouleau blanc
RFi_M	RS2	Sapinière à épinette noire

Silvicultural treatments			
CPIRL	Irregular shelterwood with slow regeneration	EPC	Pre-commercial thinning
CPRS	Cutting with protection of regeneration and soils	EC	Commercial thinning
CT	Clearcut	Pli	Intensive tree planting
DEG	Mechanical clearing	PLb	Basic tree planting
NET	Cleaning	REG	Infilling tree planting
		SCA	Scarification

Forest types			
Bp	Birch stand	Fx	With deciduous trees
Ep	Spruce stand	Rx	With softwood trees
Pe	Poplar stand		
Pg	Jack pine stand		
Sb	Fir stand		

8.6. Silvicultural Strategy

Before presenting the 2018-2023 management strategy, it is opportune to take note of the five-year assessment for the 2013-2018 period. This draws a portrait of the strategies selected and operational efforts that have been invested.

8.6.1. Five-year assessment of the silvicultural strategy for the 2013-2018 period

In general, implementation of the silvicultural strategy achieves the objectives set. There is nonetheless some work that does not achieve the targets. This is the case in general for commercial thinning and the various work of stand tending treatments. In the case of commercial thinning, this situation is mainly due to the progressive availability of eligible stands over time. Indeed, since the target is an average of the next 25 years' availability, it is difficult to begin the period reaching the targets planned. This situation will be corrected for the 2018-2023 while the target will be based on the average of the next 10 years. Other factors are also added to explain the difficulties in reaching targets such as the low profitability of the work, the difficulty in finding stands with the minimum requirements in the field and the availability of adapted machinery. With respect to stands tending treatments (clearing, cleaning and pre-commercial thinning), it seems that in several MUs the availability in the field of eligible stands is less than the expected targets. Adjustments to the 2018-2023 targets have been made in this regard.

In the case of tree planting, in proportion to the area of regeneration cuttings, the intended target is reached. However, in absolute value it is below the target. This situation is due to the regeneration cutting areas which are less than the assumption used in calculating Annual Allowable Cut (AAC or Possibilité forestière in French). Following a summary analysis, this gap is explained by several factors: the volume actually harvested is less than the Annual Allowable Cut or the volume per hectare of harvested stands is higher than that simulated. The second factor may be due to inaccurate inventory or to unintentional selection for planning of stands with a greater volume per hectare. In collaboration with the BFEC, this finding will be analyzed during future Annual Allowable Cut calculations to determine, if possible, its impact on Annual Allowable Cut.

It must also be clarified that tree planting was carried out consistently with an objective of 2,000 plants/ha in continuity with historical achievement despite certain silvicultural scenarios providing for a target of 1,600 plants/ha. Given the problems associated with achievement of commercial thinning previously mentioned in denser plantations, we envisage achievement of tree planting at 1,600 plants/ha on many sites from the 2018-2023 period.

Planting of exotic species is a sensitive issue for the forest certification agencies. The main purpose of using exotic species in plantations is to intensify timber production in specific areas of the territory. According to the Invasive Species Specialist Group (ISSG), the exotic species used for planting in Québec are not considered to be invasive. For more information, see : http://www.issg.org/

Table 25 : Silvicultural Strategy Assessment – 2013-2018 Period (R16.0)

	8652		
Commercial treatments	**Cible (ha)**	**Réalisé (5 ans)* (ha)**	**superficie réalisée / cible (%)**
Cutting with protection of regeneration and soils (without retention)	**7760**	**4400**	**57%**
Cutting with protection of regeneration and soils (with variable retention)**	**1940**	**2732**	**141%**
Cutting with protection of regeneration and soils *(2012 à 2017)****	**NA**	**6202**	**64%**
Total for régénération cutting (CR) *	**9700**	**7132**	**74%**
Commercial thinning	**750**	**19**	**3%**
Irregular shelterwood	**550**	**835**	**152%**
Total for partial cutting (CP)	**1300**	**854**	**66%**
Total for commercial treatments (harvest)	**11000**	**7986**	**73%**
Non commercial treatments			
Partial scarification	**310**	**160**	**52%**
Full scarification	**4714**	**4577**	**97%**
Total for field preparation	**5025**	**4737**	**94%**
Ligniculture (fast growing species)	**0**	**0**	
Intensive tree planting (2 000 trees/ha)	**2755**	**4150**	**151%**
Basic tree planting (1 600 trees/ha)	**1959**	**0**	**0%**
Tree planting infilling (regarni)	**0**	**0**	**#DIV/0!**
Total for tree planting	**4714**	**4150**	**88%**
Cleaning and brush cutting in natural regeneration stand	**0**	**748**	
Precommercial thinning	**0**	**1344**	
Plantation clearing	**4050**	**198**	**5%**
Pruning (élagage)	**0**	**0**	
Total for tending treatments (travaux d'éducation)	**4050**	**2290**	**57%**
Total for non commercial treatments	**13789**	**11177**	**81%**

* Update made with 2013, 2014, 2015, 2016 annual reports. The area DOES NOT include the planned unharvested area.

** The VOIT related to dead wood has a target of 20% 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 from 2012 to 2016. It serves to put into perspective the result of the return to production.

Tending treatments were completed only where they were necessary. All plantations were monitored. Reforestation was carried out with a target of 2,000 plts / ha. The balance of operations can be completed over several years /MU. We try to prioritize large worksites that can be completed in a single year.

8.6.2. Silvicultural strategy selected for the 2018-2023 Period (Target)

The regional silviculture strategy is based on guidance documents (guides sylvicoles) and expertise acquired at regional scale, whether from the results of work conducted by various work committees, training or experience. In a context of ecosystem-based management, the silviculture strategy is inspired by the disturbance regimes typical of the area. As regards bioclimatic domains of black spruce stands and balsam fir-white birch stands, the silviculture strategy is guided by disturbance regimes, either in whole or in part, with a level of intensity varying from moderate to severe.

The silviculture strategy proposes various scenarios for performing the right treatment sequences at the right place, according to site productivity, autecology of desirable species and quality of standing timber while incorporating certain measures associated with global changes.

The result is a filter of silviculture treatments and scenarios that can apply to most stands typical of the region.

As is the case with a decision key, the filter guides foresters in their choice of actions regarding criteria like potential site vegetation, regeneration conditions, density, companion species, competing species, etc.

Table 26 : Silvicultural strategy selected for the 2018-2023 Period (Target)

	8652	
Commercial treatments	**(ha)**	**(%) of CR***
Cutting with protection of regeneration and soils (without retention)	1554	N/A
Cutting with protection of regeneration and soils (with variable retention)**	1036	40%
Total for régénération cutting (CR) *	**2590**	**N/A**
Commercial thinning	21	N/A
Irregular shelterwood	137	N/A
Total for partial cutting (CP)	**158**	**N/A**
Total for commercial treatments (harvest)	**2 748**	**N/A**
Non commercial treatments		
Partial scarification	155	6%
Full scarification	1243	48%
Total for field preparation	**1399**	**54%**
Ligniculture (fast growing species)	0	0%
Intensive tree planting (2 000 trees/ha)	676	26%
Basic tree planting (1 600 trees/ha)	619	24%
Tree planting infilling (regarni)	0	0%
Total for tree planting	**1295**	**50%**
Cleaning and brush cutting in natural regeneration stand	50	N/A
Precommercial thinning	0	N/A
Plantation clearing	560	N/A
Pruning (élagage)	0	N/A
Total for tending treatments (travaux d'éducation)	**610**	**N/A**
Total for non commercial treatments	**3 304**	**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).

** 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.

8.7. Annual Allowable Cut (AAC) and operational characteristics

The Bureau de la forestière en chef (BFEC) has the responsibility to determine Annual Allowable Cut, which corresponds to the maximum volume of annual harvests that can be continuously collected without reducing the productive capacity of the forest environment. This exercise must take certain sustainable forest management objectives into account, such as the forests' natural dynamics, including their composition and age structure as well as their diversified use.

In November 2016, the Bureau proceeded with determining the timber supplies for the 2018-2023 period for all MU of the Nord-du-Québec Region. However, a new calculation of timber supplies has not been produced for all MUs. MUs 085-62, 086-52 and 087-51 benefited from a new calculation since they had new forest inventory data. Calculation of other MUs are based on those of the preceding periods and these have had updates and recommendations for adjustments. For more details, please consult the following report on the Chief Forester's website:
http://forestierenchef.gouv.qc.ca/wp-content/uploads/2016/05/r10_synthese_regionale.pdf

You can also consult the detailed reports by management unit at the following link:
http://forestierenchef.gouv.qc.ca/documents/calcul-des-possibilites-forestieres/periode-2018-2023/possibilites-forestieres-2018-2023/

In order to maintain the economic value of the Annual Allowable Cut over time, the BFEC also provides regional forest directorates with various reports and outputs that can be used to break down the Annual Allowable Cut by operational characteristic. This breakdown is presented below in the results (R22) in the form of five-year targets that must be respected in preparation of integrated operational forest management plans and annual scheduling. These characteristics include broad forest types, operational constraints as well as stem size.

8.7.1. Five-year assessment of the Annual Allowable Cut (AAC) (R33) and 2013-2018 operational characteristics (R22)

Table 27 : Five-year assessment of the Annual Allowable Cut (AAC) (R33) and 2013-2018 operational characteristics (R22)

		8652		
	Unit	Target	Done (5 yrs)*	Done / Target (%)
ALLOCATION VOLUME**				
Fir, spruce, pine, larch (SEPM)	m³	1 089 559	1 109 085	102%
Poplar (PEU)	m³	218 462	372 767	171%
Birch (BOP)	m³	11 239	5 759	51%
All species	m³	1 319 260	1 487 611	113%
MAJOR FOREST TYPES				
Softwoods	ha	7562	6550	87%
Hardwoods	ha	47	1269	2705%
Mixed stands with a dominance of hardwood	ha	1510	691	46%
Mixed stands with a dominance of softwood	ha	1881	1172	62%
OPERATIONAL CONSTRAINTS				
Visual framing	ha	250	221	88%
Orphan stand	ha	2540	3043	120%
Riparian buffer	ha	496	383	77%
Steep slopes	ha	8	0	0%
Wood dimension (SEPM) lower 85 dm³/stem	ha	704	1348	191%
Average volume per stem (SEPM)	dm³/ti	95	111	117%
HARVESTED AREA*				
Harvested area (CR+CP)	ha	11000	9682	88%

* The realized proportion of the harvest target (regeneration + partial cutting (CR + CP)) makes it possible to judge the achievement of each target of major forest types and operational constraints. For example, if 50% of the target of CR is achieved, it is appropriate that only 50% of the target of orphan stands is achieved. The realized area includes the planned unharvested area.

** Respect of the *Annual Allowable Cut (AAC or Possibilité forestière* in french) is achieved here by following the *allocation volume (volume attribuable)*. See section 8.7.2 to understand the distinction between the two concepts.

8.7.2. Annual Allowable Cut (AAC) and its breakdown by operational characteristics selected for the 2018-2023 period

The following tables present the Gross Annual Allowable Cut as well as the reductions to be applied to arrive at the net Annual Allowable Cut. The net Annual Allowable Cut presented is then reduced by various factors to obtain the attributable volume for allocation of different forest harvest rights. For example, the volume of net Annual Allowable Cut can be reduced by considering a freeze of forest strata to take into account the fact that certain species do not find a taker.

Table 28 : Presentation of the Annual Allowable Cut (AAC) (R33) and Allocation Volume (m^3/yr) per MU

Management unit: 086-52	SEPM[6]	Poplar	Birch	Maple	Cedar	Pine	Total
Gross annual allowable cut[1]	264 200	96 970	5 920	0	0	0	367 090
Reductions							
1) Per stem	19 002	7 439	528	0	0	0	29 585
1a) Decay	4 713	6 140	150				
1b) Saw cut	2 624	971	59				
1c) Bucking	0	0	133				
1d) Inventory adjustment[2]	11 665	329	186				
2) Branches volume		2 239	387	0			
Net annual allowable cut[3]	245 208	87 292	5 005		0	0	337 505
3) Forest certification (for all MUs)	0	0	0		0		0
4) Paix des Braves* method (non-harvesting along riparian strips for 14 MU)	0	0	0				0
5) Others reductions	0	0	0				0
Allocation volume before forest stand freeze[4]	245 208	87 292	5 005	0	0	0	337 505
Gap (2015-18) (m^3)	8 956	3 596	-743				11 809
***6) Forest* stands freeze to take account of certain species without taker**	0	0	0		0		0
Allocation volume[5]	245 208	87 292	5 005	0	0	0	337 505
Gap (2015-18) (m^3)	30 498	45 543	2 580				78 622

* Agreement Concerning a New Relationship Between le Gouvernement du Québec and the Crees of Québec

1 Source : http://forestierenchef.gouv.qc.ca/wp-content/uploads/2016/05/r10_synthese_regionale.pdf

2 Relative difference between gross merchantable volume definition from field inventory and after harvest measurement

3 The Net annual allowable cut applies the per stem reduction. For hardwood species, it is presented without branches volume

4 The allocation volume before forest stand freeze is built from the net allowable cut on which reductions have been applied, exemption made for forest stand freeze for which some species have no taker

5 The allocation volume means the minister's available volume for granting different (droits forestiers) rights.

6 SEPM : Fir, Spruce, jack pine, larch

Source:
BUREAU DU FORESTIER EN CHEF. « Fiche synthèse régionale détaillée — région 10 — Nord-du-Québec », 4 pages.

Table 29 : Annual Allowable Cut (AAC) (R33.0) and harvest target per operational characteristics (R22.0) – 2018-2023

		8652	
	Unit	Target	(%) harvested area*
ALLOCATION VOLUME**			
Fir, spruce, pine, larch (SEPM)	m^3	245200	N/A
Poplar (PEU)	m^3	87300	N/A
Birch (BOP)	m^3	4700	N/A
All species	m^3	337200	N/A
MAJOR FOREST TYPES			
Softwoods	ha	2005	73%
Hardwoods	ha	320	12%
Mixed stands with a dominance of hardwood	ha	274	10%
Mixed stands with a dominance of softwood	ha	149	5%
OPERATIONAL CONSTRAINTS			
Visual framing	ha	98	4%
Orphan stand	ha	694	25%
Riparian buffer	ha	2	0%
Steep slopes	ha	88	3%
Wood dimension (SEPM) lower 85 dm^3/stem	ha	399	15%
Average volume per stem (SEPM)	dm^3/ti	102	N/A
HARVESTED AREA*			
Harvested area (CR+CP)	ha	2748	N/A

* Achievement of the targets of the major forest types and operational constraints is evaluated according to a proportion of the harvested area of the item monitored on the harvested area (CR+CP). Harvested area includes planned area not harvested.

** Respect of the Annual Allowable Cut (AAC or ''Possibilité forestière'' in french) is achieved here by tracking the allocation volume. See section 8.7.2 to understand the distinction between the two concepts.

*** Harvesting riparian buffer is no longer permitted on the territory of the Paix des Braves. (art.3.12.1 a))

8.8. Climate changes

Climate change is a consequence of the rapid increase of greenhouse gases in the atmosphere due to industrialization since about 1850. They are manifested by a modification of several components of the climate, including a gradual increase of the average temperature, variations in the quantity and distribution of precipitation, and the frequency and magnitude of extreme weather events, which alter species' habitats, growth and survival. Indirectly, the regime of natural disturbances (fire, insect epidemic, windthrow) is also modified by climate change and affects, among other things, the structure and composition of ecosystems. The fight against climate change can be achieved by reducing the emission of greenhouse gases and promoting the process of carbon sequestration. However, despite the fact that control efforts will be made, climate change will be felt and may increase in the future. To limit the anticipated negative impacts on forest ecosystems, efforts must also be made to adapt forests to the new climatic conditions so that they maintain their productivity and continue to deliver the socio- economic services expected by society. Thus, adaptation of forest management represents an important solution for this global issue. An expert committee has been formed within the MFFP to develop a forest adaptation strategy and our forest practices and the Nord-du-Québec region is one of the pilot regions to test the feasibility of certain analyzes and ways to do, the goal being to begin implementation of this strategy in 2023.

PART 5: Forest Monitoring

9 Forest Monitoring

Forest monitoring is used to ensure compliance with directives arising from the forest development strategy, and to make sure objectives are achieved. Monitoring results play an important role as input to help improve practices over time. This section focuses on compliance monitoring and efficiency monitoring.

9.1 Main lines of plan implementation

Silvicultural prescriptions, along with marking instructions and operational instructions, apply to all work carried out in the field. They also reflect any harmonization measures agreed upon with other forest users. In some respects, silvicultural prescriptions act as a specification for performance of the contract signed by the MFFP and the operator. This is the basis for implementation of the forest development strategy.

Work carried out by operators is structured by a process deployed throughout the region by the MFFP:

- Before the work starts, the MFFP organizes a start-up meeting with the operators, to ensure that the silvicultural prescriptions and operational instructions have been understood.
- When the work is underway, the MFFP visits the site periodically, to continue the start-up meeting and ensure, through field observations, that the silvicultural prescriptions have been understood and applied properly.
- When the work has been completed, the operator, in its activity report, must confirm that it has carried out the work in compliance with the silvicultural prescription and operational instructions.

9.2 Types of forest monitoring

The inventory and sampling guide proposes a classification of forest monitoring to standardize the evaluation of whether or not objectives have been achieved. The categories are distinguished mainly by the elements that are measured and the territorial scale. Compliance monitoring and efficiency monitoring are performed for the logging sector, at relatively short intervals, once the work has been carried out by an operator. These two types of monitoring are closely linked to the forest development strategy implementation assessment and to the tactical and operational planning processes.

The other three categories of monitoring (reference, validation and implementation) usually apply to very large areas or specific needs. They may be used to assess the implementation of the forest development strategy, but are generally addressed in separate parts of the planning process.

9.3 Compliance monitoring.

Compliance, or “control”, monitoring is used to see whether management activities are carried out in compliance with instructions, standards and current regulations.

The MFFP relies primarily on self-monitoring by operators, and on the signatures and responsibility of their forest professionals. It carries out controls by means of sampling to verify the declarations made by forest engineers.

This approach is used to assess the compliance of the work done, while maintaining the accountability of operators. The risk-based sampling approach is used for regional control plans. The frequency and level of the controls are determined according to the intensity of the activity concerned, the complexity of the treatment, the risks to the environment and the prior performance of the operator. This approach, based on the undertakings made by the ROS in its Environmental and Forest-Based Policy, should help to detect problems before they become established and cause major, irreversible damage to the forest and the organization. The process is intended to be flexible, to allow for ongoing risk assessments. In short, the results of the monitoring work are used to adapt or improve forest development practices and strategies.

9.4 Efficiency monitoring

Efficiency monitoring is used to see whether the methods used to perform the work were sufficient to achieve the objectives of the silvicultural prescription. The aim of most forest management work is the establishment and growth of regeneration. The efficiency of other criteria set out in the silvicultural prescription may also be monitored.

The Sustainable Forest Management Strategy presents a silvicultural intensity gradient that facilitates the monitoring of silvicultural scenarios and is used to allocate resources more effectively.

The Auditor General of Québec (VGQ) filed, on May 31, 2017, the results of a performance audit of forestry work under the responsibility of the Ministère des Forêts, de la Faune et des Parcs. In this report, the VGQ made ten recommendations on observed deficiencies, including on specifically focused on follow-up effectiveness:

“Perform monitoring necessary to assess whether forestry work done delivers the desired results, to determine corrective measures and to promote continuous improvement of practices.”

The MFFP has adhered to all of the recommendations and, following creation of a working table on forest monitoring, has presented the VGQ with an action plan to implement initiatives to respond to this recommendation.

The Nord-du-Québec region currently sits on this working table on forest monitoring and will contribute to the achievement of the departmental action plan. As a result, the region has adapted its effectiveness monitoring program, existing since 2015, and will ensure its implementation.

In the following table, you find the monitoring schedule for the different silvicultural treatments.

Table 30 : Efficiency monitoring schedule (R15.1)

		Evaluation of regeneration following a silvicultural treatment	
Intensity gradient	**Type of treatment**	**1st monitoring** (establishement of regeneration)	**2nd monitoring** (state of regeneration)
Extensive	Regeneration cutting (CR)	Between 1 to 10 years	None
	Irregular Shelterwood (CPI) (A partial cut made with a regeneration goal)	Between 1 to 10 years	None
	Natural perturbation	Between 4 to 10 ans	None
Basic	Regeneration cutting (CR)	Between 1 to 5 years	Between 5 to 15 years
	Artifical regeneration : Tree planting (REB) Infilling (REG) Seeding (ENS)	Between 1 to 5 years	Between 5 to 15 years
	Irregular Shelterwood (CPI) (A partial cut made with a regeneration goal)	Between 3 to 5 years	None
Intensive including the high yield wood production area (AIPL)	Regeneration cutting (CR)	Between 3 to 5 years	Between 5 to 10 years
	Artifical regeneration : Tree planting (REB) Infilling (REG) Seeding (ENS)	Between 3 to 5 years	Between 5 to 10 years
	Irregular Shelterwood (CPI) (A partial cut made with a regeneration goal)	Between 3 to 5 years	None

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

The following tables illustrate the minimum target to reach according the type of monitoring for each silvicultural intensity gradient.

Actions to be taken when the target is not reached may result in prescriptions for scarification, tree planting, infilling, mechanical clearing, cleaning and pre-commercial thinning.

Table 31 : Minimum target – 1st efficiency monitoring

1st efficiency monitoring	Silvicultural intensity gradient		
	Extensive (Target density of 1 200 stems/ha well distributed)	**Basic** (Target density of 1 600 stems/ha well distributed)	**Intensive** (Target density of 1 200 stems/ha well distributed)
Methods	Classification of aerial images and / or photo-interpretation or field reconnaissance	Classification of aerial images and / or photo-interpretation or field reconnaissance	Monitoring required
Minimum target	Coefficient of distribution for commercial species of 50%	Coefficient of distribution for desired species of 75%	Coefficient of distribution for desired species of 75%
Actions to take when the target is not reached	Actions required, if possible	Actions required, if possible	Actions required, if possible

2nd efficiency monitoring	Silvicultural intensity gradient		
	Extensive (Target density of 1 200 stems/ha well distributed)	**Basic** (Target density of 1 600 stems/ha well distributed)	**Intensive** (Target density of 1 200 stems/ha well distributed)
Methods	None	Classification of aerial images and / or photo-interpretation or field reconnaissance and, if actions are required : Intervention monitoring	Monitoring required
Minimum target	None	Coefficient of distribution of desired species stem free to grow of 75%	Coefficient of distribution of cleared stem of desired species of 75%.
Actions to take when the target is not reached	None	Actions required, if possible	Actions required

Assessments and feedbacks of monitoring allow validation of silvicultural scenarios and management strategies. Some adjustment of silvicultural scenarios may result from theses.

The Sustainable Forest Development Act specifies that the MFFP must produce a five-year assessment of sustainable forest management. This assessment covering the period from April 1, 2018, to March 31, 2023, will be tabled in the National Assembly during 2024. Several indicators of the Five-year Assessment of Sustainable Forest Management will facilitate maintenance of forest certification.

The following tables show the status of monitoring for the implementation of the regeneration of the harvest operations of the last decade, 2013-2018

Table 32 : Assessment on return of the regeneration over harvested areas for the 2013-2018 period

Inside regeneration cut area	UA 086-52 Total (ha)
Goal achieved - Natural stand	224
Goal achieved - Reforested by tree planting	3 442
Goal not achieved - Treatment done - Waiting for the results	0
Goal not achieved - Treatment planed - Upcoming realization	2 055
Goal not achieved - Area regenerated by other species	14
Goal not achieved - Unregenerated and abandoned area	18
Goal not achieved - Upcoming planner's analysis	52
Upcoming check	970
Impossible to prononce - Data not available	0
Total harvested area	**6 775**

Inside partial cut (CP)	UA 086-52 Total (ha)
Goal achieved	9
Goal not achieved - Treatment done - Waiting for the results	71
Goal not achieved - Treatment planed - Upcoming realization	449
Goal not achieved - Area regenerated by other species	0
Goat not achieved - Unregenerated and abandoned area	0
Upcoming check	307
Impossible to prononce - Data not available	0
Total harvested area	**836**

9.5 Monitoring of the silvicultural strategy, operational characteristics and allowable cut

The targets of the silvicultural strategy, the operational characteristics and the allowable cut must be reviewed every five years. Detailed methodologies for the five-yearly review are set out in provincial and regional instructions, to ensure that these aspects are monitored properly. Section 8.6.1 of this tactical plan contains the review of the silvicultural strategy for the period 2013-2018. Section 8.7.1 contains the review of the operational characteristics and allowable cut for the same period.

9.6 Monitoring of Issue-Solution Fact Sheets

Section 8.2 presents the Issue-Solution Fact Sheets and the initial results for the various indicators that are monitored. The indicators are monitored every year, every five years or every ten years, depending on the availability of calculation data.

10 Signatures

(Original signed)

Responsabilité professionnelle:

Le plan d'aménagement forestier intégré tactique pour l'unité d'aménagement 086-52 a été réalisé sous ma responsabilité professionnelle dans le respect des lois, des règlements et des ententes en vigueur ainsi que dans le respect des objectifs fixés par le ministre des Forêts, de la Faune et des Parcs. Le plan a aussi été réalisé à l'aide de la meilleure information pertinente et disponible à ce jour incluant celle fournie par les personnes nommées ci-dessous.

_____ ing.f. Date : *20 décembre 2019*

Valérie Guindon, ing.f., no. de permis 03-034
Coordonnatrice des plans d'aménagement forestier intégré tactiques jusqu'en octobre 2019,
Direction de la gestion des forêts du Nord-du-Québec

_____ ing.f. Date : *9 octobre 2020*

Paul Maxime Otye Moto, ing.f., no. de permis 14-015
Coordonnateur des plans d'aménagement forestier intégré tactiques à partir d'octobre 2019,
Direction de la gestion des forêts du Nord-du-Québec

J'atteste de plus que les ingénieurs forestiers suivants ont également contribué à l'élaboration du présent plan d'aménagement forestier pour les travaux cités ci-dessous :

_____ ing.f. Date : *9 octobre 2020*

Dave Levasseur, ing.f. no. de permis 12-035
Aménagiste pour l'UA 86-52

_____ ing.f. Date : *9 octobre 2020*

Sabrina Morissette, ing.f. no. de permis 05-020
Coordonnatrice aux affaires autochtones
Direction de la gestion des forêts du Nord-du-Québec
Responsable des sections 2 et 5.3

_____ ing.f. Date : *20 décembre 2019*

Virginie Cayer, ing.f. no. de permis 02-077
Direction de la gestion des forêts du Nord-du-Québec
Responsable des sections 8.3, 8.4 et 8.5

_____ ing.f. Date : *9 octobre 2020*

Sébastien Leduc, ing.f. no. de permis 03-031
Coordonnateur régional de la planification forestière,
Direction de la gestion des forêts du Nord-du-Québec
Responsable des sections 8.8.1 (R22.0 et R33) et 8.8.2 (R22.1) sur la possibilité forestière

J'atteste que les biologistes suivantes ont également contribué à l'élaboration des stratégies ayant influencé le présent plan :

_____ biologiste Date : *9 octobre 2020*

Sophie Dallaire, biologiste M Sc.
Direction de la gestion des forêts du Nord-du-Québec
Responsable des sections sur les enjeux écologiques, les VOIC, les objectifs d'aménagement et solutions

_____biologiste Date : *9 octobre 2020*

Sonia Légaré, biologiste Ph.D.
Direction de la gestion des forêts du Nord-du-Québec
Responsable des sections sur le caribou forestier, la gestion des voies d'accès, l'envahissement par les éricacées et la paludification

Responsabilité administrative :

Approbation du plan d'aménagement forestier intégré tactique par le MFFP

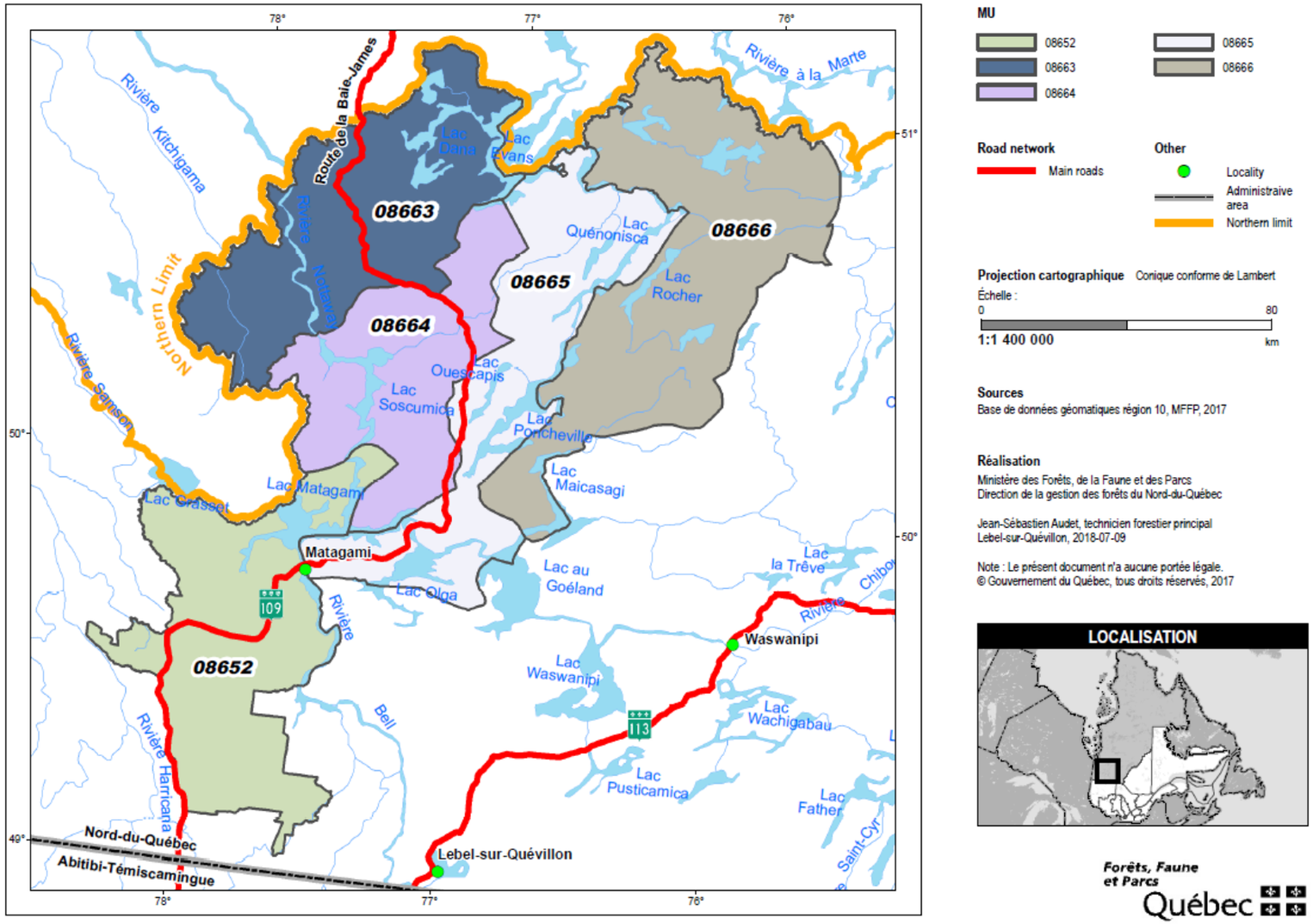
_____ Date *13 octobre 2020*

Marco Trudel,
Directeur régional de la gestion des forêts du Nord-du-Québec

11 Appendix

Appendix A – Maps

Map 8 : Location of the management units (MU)



MU

08652
08663
08664
08665
08666

Road network
Main roads

Other
Locality
Administraive area
Northern limit

Projection cartographique Conique conforme de Lambert

Échelle :
0 80
1:1 400 000 km

Sources
Base de données géomatiques région 10, MFFP, 2017

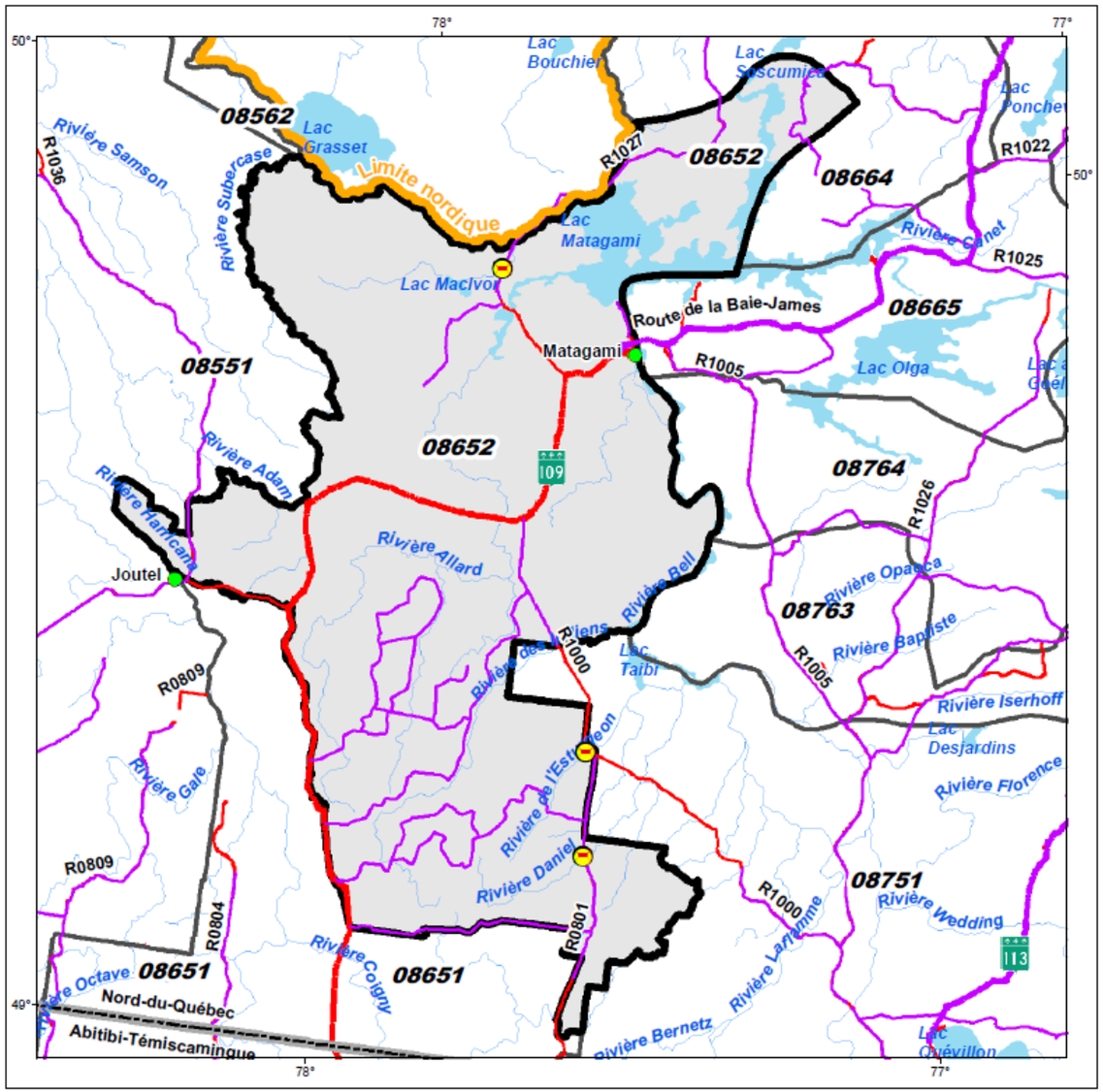
Réalisation
Ministère des Forêts, de la Faune et des Parcs
Direction de la gestion des forêts du Nord-du-Québec

Jean-Sébastien Audet, technicien forestier principal
Lebel-sur-Quévillon, 2018-07-09

LOCALISATION

Forêts, Faune et Parcs
Québec

Map 9 : Main roads and infrastructure to maintain and develop per management unit (R11)



Infrastructure

- Sand/gravel pit
- Bridge

Various

- Locality
- Administrative boundary
- Forestry limit

Road network

- Main roads

Territorial subdivisions

- MU 08652
- Surrounding MU

Projection cartographique : Conique conforme de Lambert

Échelle :

0 — 40 km

1:700 000

Sources

Base de données géomatiques région 10, MFFP, 2018

Réalisation

Ministère des Forêts, de la Faune et des Parcs
Direction de la gestion des forêts du Nord-du-Québec

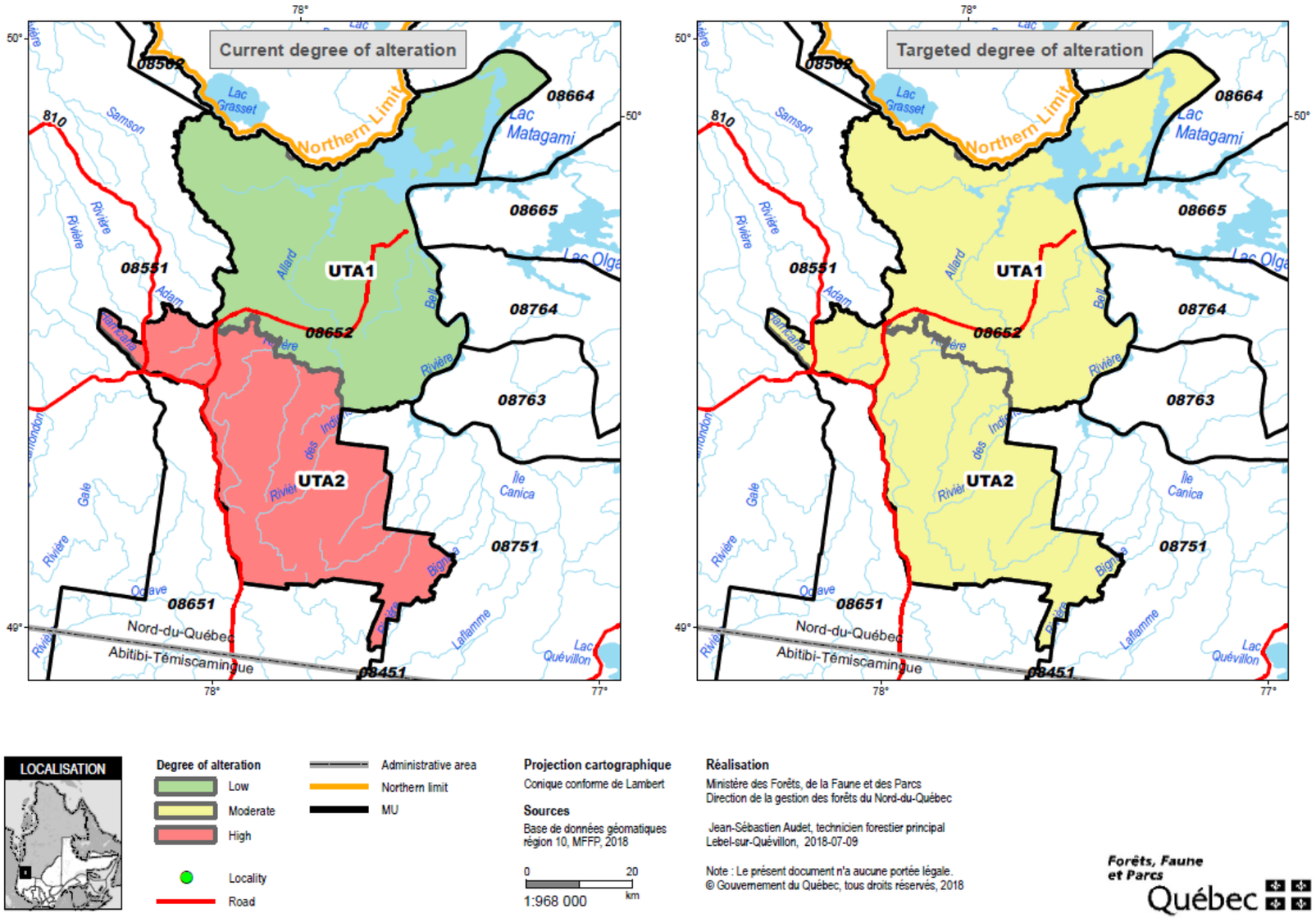
François Bujold, technicien en géomatique
Lebel-sur-Quévillon, 2018-08-25

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

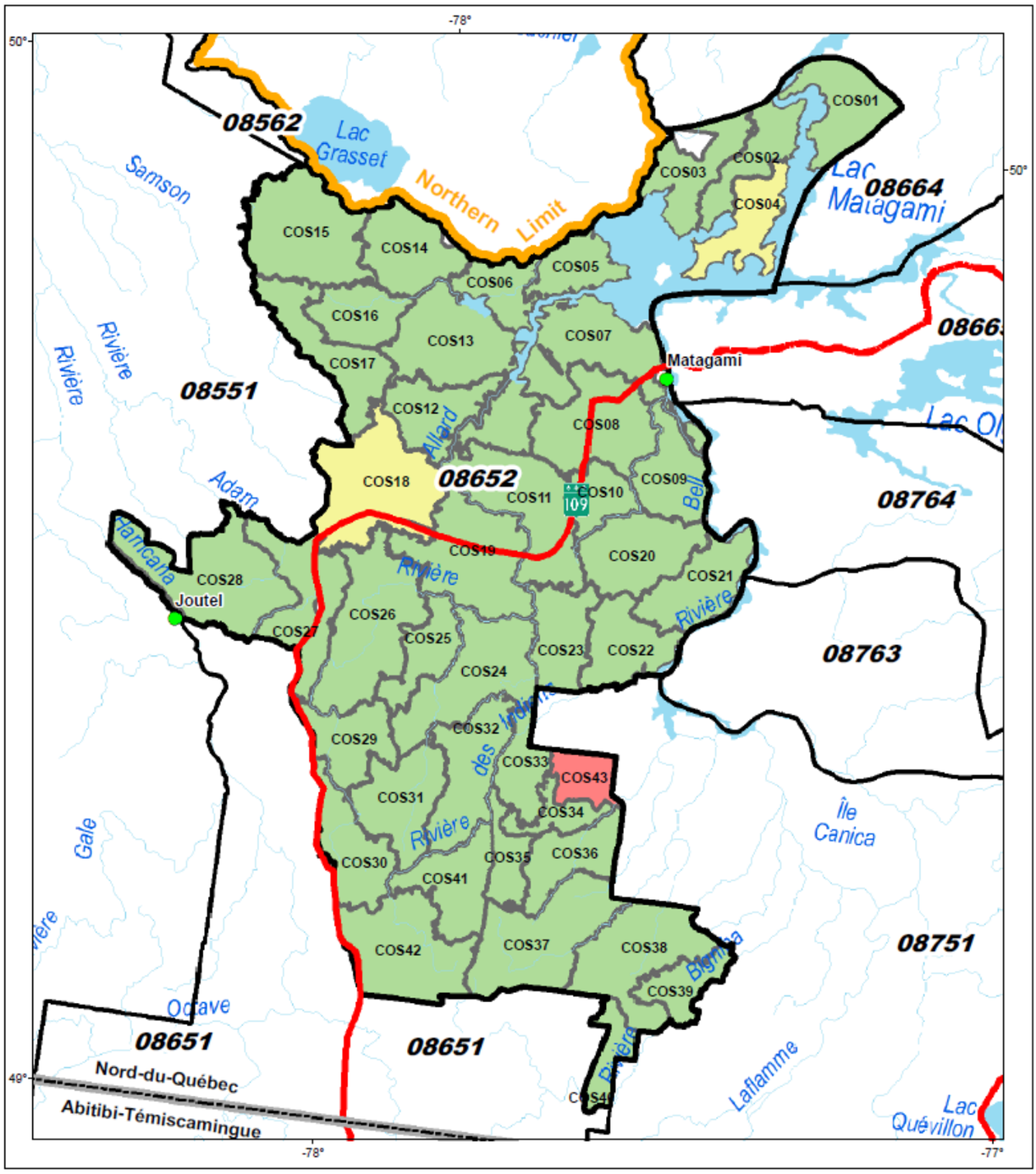
LOCATION

Forêts, Faune et Parcs
Québec

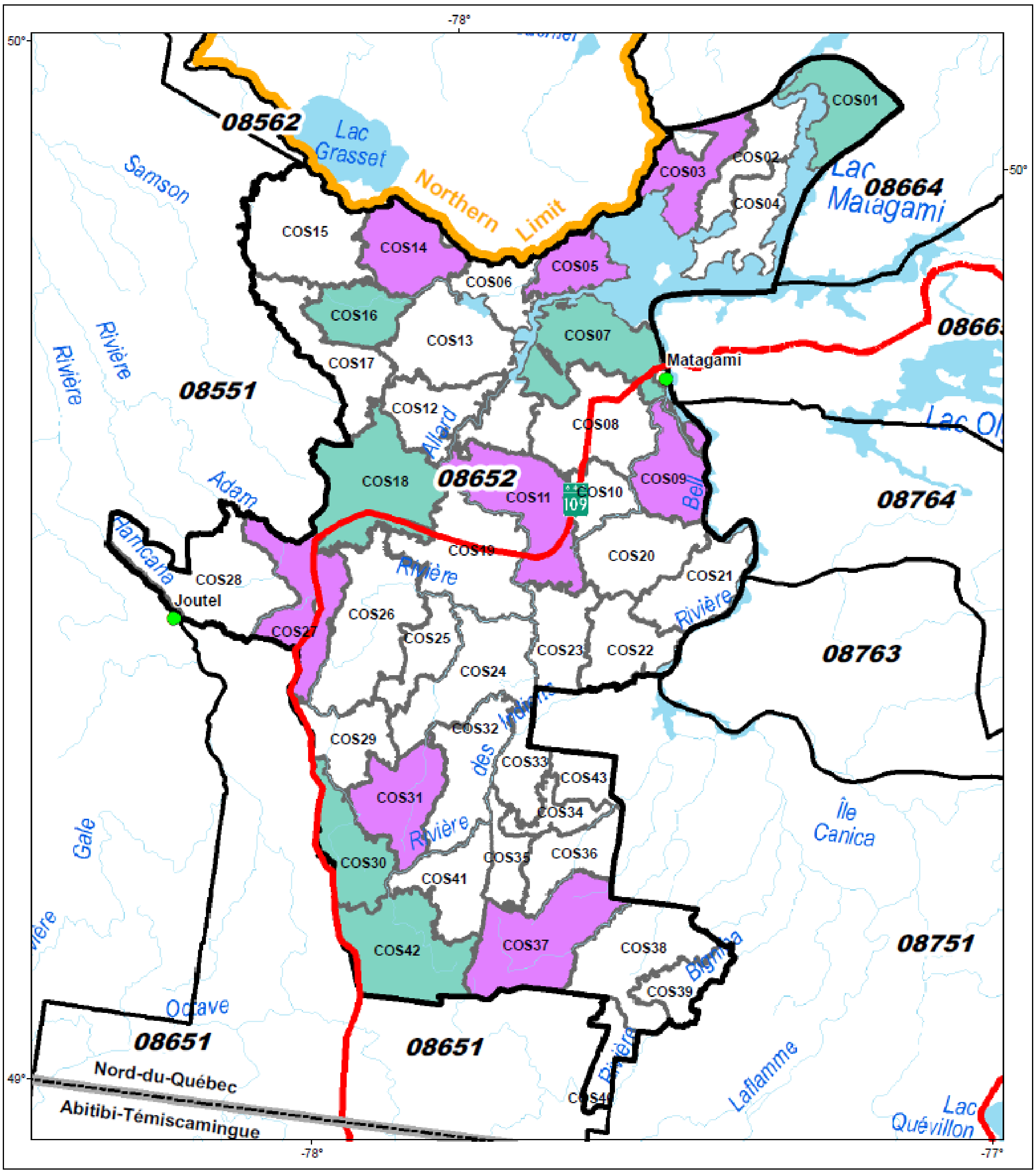
Map 10 : Comparison between current and targeted degrees of alteration



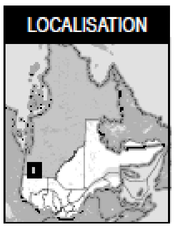
Map 11 : Boundaries and types of spatial organization compartments



Map 12 : Presentation of forested core areas and sensitive core areas



LOCALISATION



Locality

Road

MU (limit)

Tracts

Large forest tracts

Critical large forest tracts

Projection cartographique
Conique conforme de Lambert

Échelle
0 10 km

1:620 000

Sources
Base de données géomatiques région 10, MFFP, 2018

Réalisation
Ministère des Forêts, de la Faune et des Parcs
Direction de la gestion des forêts du Nord-du-Québec
François Bujold, technicien en géomatique
Lebel-sur-Quévillon, 2018-07-11
Note : Le présent document n'a aucune portée légale.
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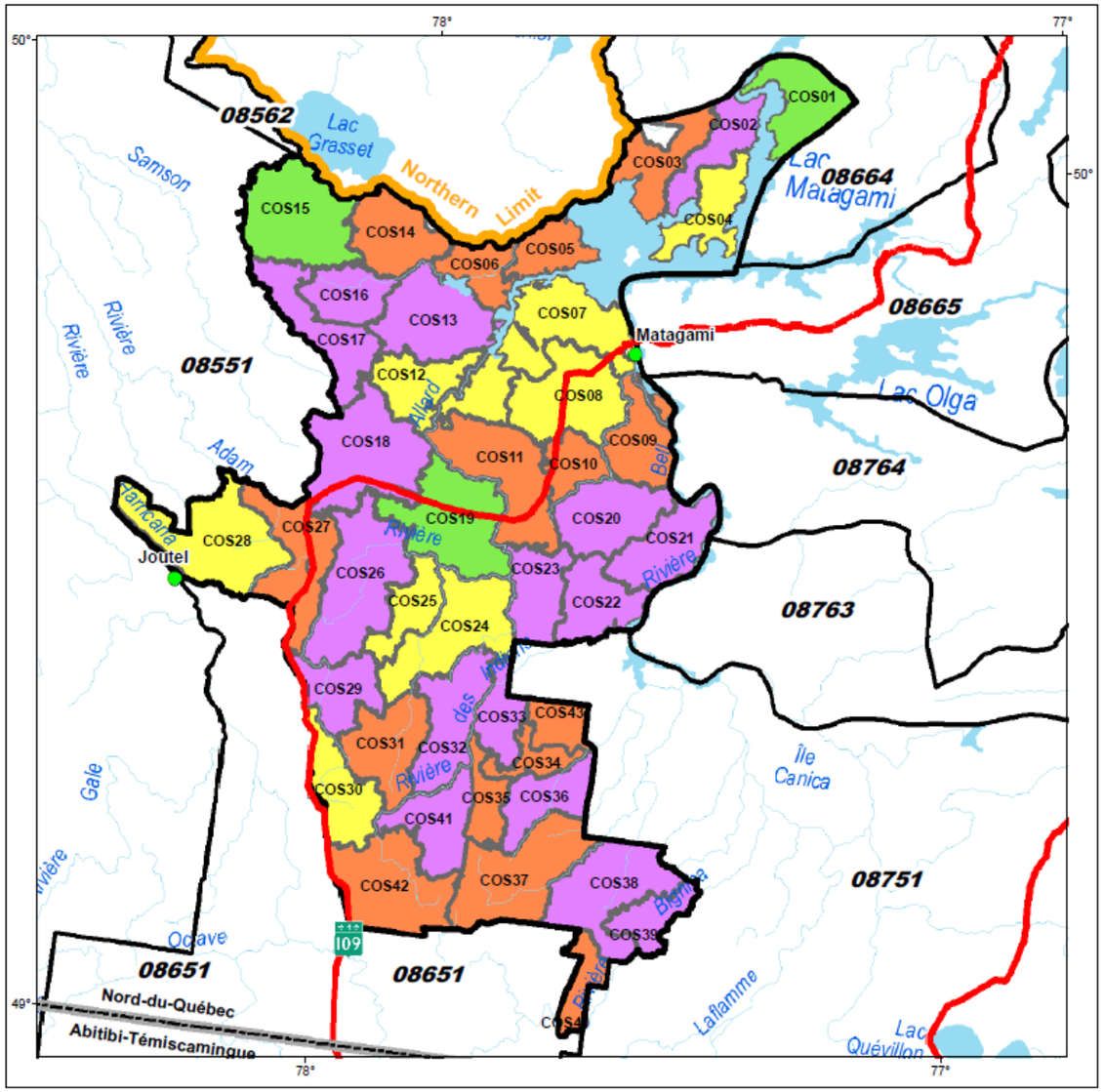
Forêts, Faune et Parcs
Québec

Map 13: Harvest priorities of spatial organization compartments



Harvesting priority

- 1
- 2
- 3
- 4

Other

- Locality
- Administrative area
- Northern Limit
- MU (limit)
- Road

Projection cartographique : Conique conforme de Lambert

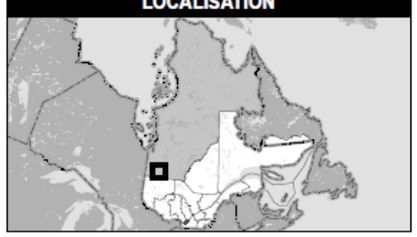
Échelle :
0 40
1:700 000 km

Sources
Base de données géomatiques région 10, MFFP, 2018

Réalisation
Ministère des Forêts, de la Faune et des Parcs
Direction de la gestion des forêts du Nord-du-Québec

François Bujold, technicien en géomatique
Lebel-sur-Quévillon, 2018-07-11

LOCALISATION



Forêts, Faune et Parcs
Québec

Appendix B – List of wildlife and plants species at risk for Nord-du Québec

Table 33 : List of wildlife and plants species at risk likely to be found in forested area of Nord-du-Québec

LEMV[1] : Endangered or Vulnerable Species Act SARA[2] : Species at Risk Act COSEWIC[3] : Committee on status of Endangered Wildlife in Canada

Taxonomic group	Species	Status				Protection measure	Fact sheet	
		Provincial (LEMV)[1]	Federal (SARA)[2]	Federal (COSEWIC)[3]	Regional		Provincial	Federal
Amphibians	**Triton vert** **Eastern Newt** *Notophthalmus viridescens*	None	None	None	Rare and unusual			
Mammals	**Cerf de Virginie** **Virginia Deer** *Odocoileus virginianus*	None	None	None	Rare and unusual			
Mammals	**Belette pygmée** **Least Weasel** *Mustela nivalis*	Susceptible	None	None			Fiche provinciale belette pygmée	
Mammals	**Campagnol des rochers** **Rock Vole** *Microtus chrotorrhinus*	Susceptible	None	None			Fiche provinciale campagnol des rochers	
Mammals	**Campagnol-lemming de Cooper** **Southern Bog Lemming** *Synaptomys cooperi*	Susceptible	None	None			Fiche provinciale campagnol-lemming de Cooper	
Mammals	**Carcajou** **Wolverine** *Gulo gulo*	Threatened	Special concern	Special concern			Fiche provinciale carcajou	Fiche Federale carcajou
Mammals	**Caribou des bois, écotype forestier, population boréale** **Woodland Caribou, Forest-dwelling ecotype, Boreal population** *Rangifer tarandus caribou*	Vulnerable	Threatened	Threatened			Fiche provinciale caribou des bois écotype forestier	Fiche Federale caribou des bois écotype forestier
Mammals	**Chauve-souris argentée** **Silver-haired Bat** *Lasionycteris noctivagans*	Susceptible	None	None			Fiche provinciale chauve-souris argentée	
Mammals	**Chauve-souris cendrée** **Hoary Bat** *Lasiurus cinereus*	Susceptible	None	None			Fiche provinciale chauve-souris cendrée	

Taxonomic group	Species	Status				Protection measure	Fact sheet	
		Provincial (LEMV)[1]	Federal (SARA)[2]	Federal (COSEWIC)[3]	Regional		Provincial	Federal
Mammals	**Chauve-souris nordique** **Northern Myotis** *Myotis septentrionalis*	None	Endangered	Endangered				Fiche Federale chauve-souris nordique
Mammals	**Chauve-souris rousse** **Eastern Red Bat** *Lasiurus borealis*	Susceptible	None	None			Fiche provinciale chauve-souris rousse	
Mammals	**Cougar** **Cougar** *Puma concolor*	Susceptible	None	None			Fiche provinciale cougar	
Mammals	**Musaraigne longicaude** **Long-tailed Shrew** *Sorex dispar*	Susceptible	None	None				
Mammals	**Petite chauve-souris brune** **Little Brown Myotis** *Myotis lucifugus*	None	Endangered	Endangered				Fiche Federale petite chauve-souris brune
Birds	**Aigle royal** **Golden Eagle** *Aquila chrysaetos*	Vulnerable	None	Not at risk		Modalité aigle royal	Fiche provinciale aigle royal	Fiche Federale aigle royal
Birds	**Arlequin plongeur, Population de l'Est** **Harlequin Duck, Eastern population** *Histrionicus histrionicus*	Vulnerable	Special concern	Special concern			Fiche provinciale arlequin plongeur	Fiche Federale arlequin plongeur
Birds	**Cormoran à aigrettes** **Double-crested Cormorant** *Phalacrocorax auritus*	None	None	Not at risk	Rare and unusual			
Birds	**Cygne trompette** **Trumpeter Swan** *Cygnus buccinator*	None	None	Not at risk	Rare and unusual			
Birds	**Engoulevent bois-pourri** **Eastern Whip-poor-will** *Caprimulgus vociferus*	Susceptible	Threatened	Threatened				Fiche Federale engoulevent bois-pourri
Birds	**Engoulevent d'Amérique** **Common Nighthawk** *Chordeiles minor*	Susceptible	Threatened	Special concern		Modalité engoulevent d'Amérique*		Fiche Federale engoulevent d'Amérique

Taxonomic group	Species	Status				Protection measure	Fact sheet	
		Provincial (LEMV)[1]	Federal (SARA)[2]	Federal (COSEWIC)[3]	Regional		Provincial	Federal
Birds	**Faucon pèlerin** **Peregrine Falcon** *Falco peregrinus*	Vulnerable	Special concern	Not at risk		Modalité faucon pèlerin	Fiche provinciale faucon pèlerin	Fiche Federale faucon pèlerin
Birds	**Garrot d'Islande, Population de l'Est** **Barrow's Goldeneye, Eastern population** *Bucephala islandica*	Vulnerable	Special concern	Special concern		Modalité garrot d'Islande	Fiche provinciale garrot d'Islande	Fiche Federale garrot d'Islande
Birds	**Grèbe à bec bigarré** **Pied-billed Grebe** *Podilymbus podiceps*	None	None	None	Rare and unusual			
Birds	**Gros-bec errant** **Evening Grosbeak** *Coccothraustes vespertinus*	None	None	Special concern				Fiche Federale gros-bec errant
Birds	**Hibou des marais** **Short-eared Owl** *Asio flammeus*	Susceptible	Special concern	Special concern			Fiche provinciale hibou des marais	Fiche Federale hibou des marais
Birds	**Hirondelle de rivage** **Bank Swallow** *Riparia riparia*	None	Threatened	Threatened		Modalité hirondelle de rivage*		Fiche Federale hirondelle de rivage
Birds	**Hirondelle rustique** **Barn Swallow** *Hirundo rustica*	None	Threatened	Threatened		Modalité hirondelle rustique*		Fiche Federale hirondelle rustique
Birds	**Moucherolle à côtés olive** **Olive-sided Flycatcher** *Contopus cooperi*	Susceptible	Threatened	Special concern				Fiche Federale moucherolle à côtés olive
Birds	**Paruline du Canada** **Canada Warbler** *Cardellina canadensis*	Susceptible	Threatened	Threatened				Fiche Federale paruline du Canada
Birds	**Pygargue à tête blanche** **Bald Eagle** *Haliaeetus leucocephalus*	Vulnerable	None	Not at risk		Modalité pygargue à tête blanche	Fiche provinciale pygargue à tête blanche	Fiche Federale pygargue à tête blanche
Birds	**Quiscale rouilleux** **Rusty Blackbird** *Euphagus carolinus*	Susceptible	Special concern	Special concern				Fiche Federale quiscale rouilleux
Birds	**Râle jaune** **Yellow Rail** *Coturnicops noveboracensis*	Threatened	Special concern	Special concern			Fiche provinciale râle jaune	Fiche Federale râle jaune

Taxonomic group	Species	Status				Protection measure	Fact sheet	
		Provincial (LEMV)[1]	Federal (SARA)[2]	Federal (COSEWIC)[3]	Regional		Provincial	Federal
Birds	**Urubu à tête rouge** **Turkey Vulture** *Cathartes aura*	None	None	None	Rare and unusual			
Fish	**Esturgeon jaune, Populations du sud de la baie d'Hudson et de la baie James** **Lake Sturgeon, Southern Hudson Bay – James Bay populations** *Acipenser fulvescens*, pop. du sud de la baie d'Hudson et de la baie James	Susceptible	None	Special concern			Fiche provinciale esturgeon jaune	Fiche Federale esturgeon jaune
Reptiles	**Couleuvre à ventre rouge** **Red-bellied Snake** *Storeria occipitomaculata*	None	None	None	Rare and unusual			
Reptiles	**Tortue mouchetée** **Blanding's Turtle** *Emydoidea blandingii*	Threatened	Threatened	Endangered	Rare and unusual		Fiche provinciale tortue mouchetée	Fiche Federale tortue mouchetée
Reptiles	**Tortue peinte** **Northern Painted Turtle** *Chrysemys picta*	None	None	Special concern	Rare and unusual			
Reptiles	**Tortue serpentine** **Snapping Turtle** *Chelydra serpentina*	None	Special concern	Special concern	Rare and unusual			Fiche Federale tortue serpentine
Vascular plants	**Agoséride orangée** **Orange Agoseris** *Agoseris aurantiaca var. aurantiaca*	Susceptible	None	None		Modalité flore		
Vascular plants	**Calypso d'Amérique** (syn. C. bulbeux) **Fairy Slippler** *Calypso bulbosa var. americana*	Susceptible	None	None		Modalité flore		
Vascular plants	**Chalef argenté** **American Silverberry** *Elaeagnus commutata*	Susceptible	None	None		Modalité flore		
Vascular plants	**Corallorhize striée** **Striped Coralroot** *Corallorhiza striata var. striata*	Susceptible	None	None		Modalité flore		

Taxonomic group	Species	Status				Protection measure	Fact sheet	
		Provincial (LEMV)[1]	Federal (SARA)[2]	Federal (COSEWIC)[3]	Regional		Provincial	Federal
Vascular plants	**Droséra à feuilles linéaires** **Slenderleaf Sundew** *Drosera linearis*	Susceptible	None	None		Modalité flore		
Vascular plants	**Élatine du lac Ojibway** **Ojibway Waterwort** *Elatine ojibwayensis*	Susceptible	None	None		Modalité flore		
Vascular plants	**Éléocharide de Robbins** **Robbins' Spikerush** *Eleocharis robbinsii*	Susceptible	None	None		Modalité flore		
Vascular plants	**Épervière de Robinson** **Robinson's Hawkweed** *Hieracium robinsonii*	Susceptible	None	None		Modalité flore		
Vascular plants	**Gratiole dorée** **Golden Hedge-hyssop** *Gratiola aurea*	Susceptible	None	None		Modalité flore		
Vascular plants	**Hudsonie tomenteuse** **Sand-heather** *Hudsonia tomentosa*	Susceptible	None	None		Modalité flore		
Vascular plants	**Mimule de James** (syn. M. glabre) **Geyer's Yellow Monkeyflower** *Erythranthe geyeri*	Threatened	None	None		Modalité flore	Fiche provinciale mimule de James	
Vascular plants	**Orchis à feuille ronde** (syn. Galéaris à feuille ronde) **Roundleaf Orchis** *Galearis rotundifolia*	Susceptible	None	None		Modalité flore		
Vascular plants	**Pigamon pourpré** **Purple Meadowrue** *Thalictrum dasycarpum*	Susceptible	None	None		Modalité flore		
Vascular plants	**Polygale sénéca** **Seneca Snakeroot** *Polygala senega*	Susceptible	None	None		Modalité flore		
Vascular plants	**Saule arbustif** **Little-tree Willow** *Salix arbusculoides*	Susceptible	None	None		Modalité flore		
Vascular plants	**Saule de McCall** **McCalla's Willow** *Salix maccalliana*	Susceptible	None	None		Modalité flore		

Taxonomic group	Species	Status				Protection measure	Fact sheet	
		Provincial (LEMV)[1]	Federal (SARA)[2]	Federal (COSEWIC)[3]	Regional		Provincial	Federal
Vascular plants	**Saule pseudomonticole** **False Mountain Willow** *Salix pseudomonticola*	Susceptible	None	None		Modalité flore		
Vascular plants	**Trichophore de Clinton** **Clinton's Bulrush** *Trichophorum clintonii*	Susceptible	None	None		Modalité flore		
Vascular plants	**Utriculaire à scapes géminés** **Hidden-fruit Bladderwort** *Utricularia geminiscapa*	Susceptible	None	None		Modalité flore		

* Regional modality for this species. Available on request.

Link to all the descriptive sheets of endangered or vulnerable wildlife species: http://www3.mffp.gouv.qc.ca/faune/especes/menacees/liste.asp

Link of all descriptions of threatened or vulnerable plant species: http://www.mddelcc.gouv.qc.ca/biodiversite/especes/index.htm

Species at Risk Public Registry (Federal Government): https://www.canada.ca/fr/environnement-changement-climatique/services/registre-public-especes-peril.html

Protection measures: https://www.mffp.gouv.qc.ca/publications/enligne/forets/criteres-indicateurs/1/121/121.asp

Appendix C – Local issues and objectives raised during TLGIRTs (R12)

Matagami

Integrated Land and Resources Management Panel (TGIRT) Matagami

Table of issues

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

Problem / issue	Need	Means	Indicator	Target / Objective	Responsible	Deadline / continuous	VOIT
Mooses population	Maintain or increase the mooses population	* Map the zones where will be prioritized the forest operations aimed to maintain or increase the mooses population			MFFP and joint working group	30-mars-18	Toward a VO
Conservation de l'habitat du poisson	Protection of spawning areas	* Map the zones where will be prioritized the forest operations aimed to protect the spawning areas			MFFP and joint working group	30-mars-18	No
Woodland caribou population	Preservation of the woodland caribou	* Present the " Caribou plan " to the TGIRT			MFFP		Toward a VO
Population of martens and small games	Preservation of the populations of martens and small games	* Map the zones where will be prioritized the forest operations aimed to maintain or increase the martens and small games populations			MFFP and joint working group	30-mars-18	No
Preservation of the water quality	Minimize the sedimentation caused by the forest operations	* Map the zones where will be prioritized the forest operations aimed to minimize the sedimentation caused by the forest operations			MFFP and joint working group	30-mars-18	No
Management of the road network	Optimization of the road network	* Specify the needs for the various users of roads			TGIRT panel (technical committee) and MFFP		Uncertain

Reference: Minutes of the meeting of March 9th, 2017
Reference: Minutes of the meeting of june 15th, 2017

Last update : 30 mars 2018
Revision by the TGIRT : 17 mai 2018

Appendix D – Préoccupations soulevées par les Premières nations (objectifs régionaux)

Tableau des préoccupations de Pikogan au 7 décembre 2016

No.	Valeur/Sujet	Préoccupation	Enjeux	Objectif
1A	Intégrité de sites sensibles et d'intérêt de la communauté.	Les opérations forestières peuvent déranger et détériorer l'intégrité des sites sensibles et d'intérêts lorsque réalisées à proximité de ceux-ci.	Les sites sensibles et d'intérêt ne sont pas tenus en compte dans l'aménagement actuel.	Maintenir autour des sites sensibles et d'intérêt un environnement permettant d'assurer la poursuite des activités traditionnelles.
1B	Apparence naturelle des sites sensibles et d'intérêt.	La qualité du paysage à proximité des sites sensibles et d'intérêt peut être dégradée suite aux opérations de récolte réalisées à proximité de ceux-ci, ce qui empêche la communauté d'avoir un territoire d'apparence naturelle.	Les sites sensibles et d'intérêts ne sont pas tenus en compte dans l'aménagement actuel.	Maintenir la qualité visuelle du paysage et la quiétude autour des sites sensibles et d'intérêt identifiés par la communauté.
2	Maintien de la structure interne des peuplements.	Les traitements d'éducation des peuplements (ex. : dégagement) peuvent changer la composition initiale d'un peuplement et ainsi modifier le potentiel des habitats pour les espèces fauniques présentes à préalable ce qui ne permet pas de poursuivre les activités traditionnelles de chasse et de trappe selon l'effort de chasse et de trappe habituel.	Poursuivre la pratique traditionnelle de chasse et de trappe, selon l'effort habituel *sur chaque aire de trappe*.	Limiter la simplification de la structure interne dans les jeunes peuplements de seconde venue.
3	Maintien de la composition végétale initiale du peuplement.	Le reboisement peut changer la composition initiale d'un peuplement et ainsi modifier le potentiel des habitats pour les espèces fauniques présentes à préalable ce qui ne permet pas de poursuivre les activités traditionnelles de chasse et de trappe selon l'effort de chasse et de trappe habituel.	Poursuivre la pratique traditionnelle de chasse et de trappe, selon l'effort habituel *sur chaque aire de trappe*.	S'assurer de reboiser l'essence initiale du peuplement.
4A	Maintien d'un habitat adéquat pour les espèces sensibles à la fragmentation et au manque de connectivité (VO Table LGIRT Rouyn-Noranda).	Les coupes totales trop importantes ne laissent pas assez de forêts résiduelles pour la martre entraînant une baisse de potentiel de récolte de l'échelle des terrains de trappe.	Bonne répartition spatiale d'habitat source afin de poursuivre la pratique traditionnelle de trappe, selon l'effort habituel *sur chaque aire de trappe*.	Conserver suffisamment d'habitats de qualité bien répartis à l'échelle des aires de trappe pour répondre aux besoins des espèces sensibles à la fragmentation et au manque de connectivité. *** VO développée à la Table LGIRT de Rouyn-Noranda avec M. Jean Lapointe (MFFP) comme expert-conseil.

No.	Valeur/Sujet	Préoccupation	Enjeux	Objectif
				Massif – habitat source : Bloc d'un minimum de 30 km² composé d'au moins 70 % de peuplements de 7 m et d'au moins 50 % de peuplements qualifiés d'adéquats. Adéquats : Peuplements **résineux ou mélangés** d'une hauteur de 7 m et plus (classes 1, 2, 3 et 4) dont la densité est d'au moins 40 % (classes A, B et C). Il s'agit des peuplements qualifiés de bons ou excellents selon la clé d'évaluation du potentiel de l'habitat de la martre d'Amérique (FAPAQ 2000), à l'exclusion des peuplements à dominance de pins gris ou de mélèzes.
4B	Habitat adéquat pour les espèces sensibles à la fragmentation et au manque de connectivité (VO Table LGIRT Rouyn-Noranda).	La fragmentation des habitats occasionnés par les opérations forestières peut empêcher le déplacement de certaines espèces animales d'un secteur à l'autre à l'échelle de l'aire de trappe.	Poursuivre la pratique traditionnelle de trappe, selon l'effort habituel *sur chaque aire de trappe*.	Maintenir une connectivité adéquate entre les habitats sources.
5	Maintien des frayères.	Les traverses de cours d'eau lors de la construction de chemins risquent d'entraîner un apport massif de sédiments et porter atteinte à la qualité des frayères qui ne sont pas toutes connues par le MFFP.	Destruction des sites d'habitat du poisson.	Maintenir la qualité de l'habitat des frayères pour les espèces traditionnellement pêchées.
6A	Impact des opérations forestières sur les écosystèmes forestiers.	Les opérations forestières, incluant les nouveaux chemins forestiers, peuvent avoir un impact sur les produits non ligneux de la forêt (champignons, petits fruits, plantes, etc.).	Perte d'attributs importants pour maintenir les savoirs traditionnels de la communauté.	Maintenir, par aire de trappe, des secteurs pour la production des PFNL.
6B	Impact des opérations forestières sur les écosystèmes forestiers.	L'exploitation des bouleaux à papier empêche les communautés autochtones de s'approvisionner en écorce de qualité pour confectionner des objets traditionnels (raréfaction de bétulaies blanches de qualité).	Perte d'attributs importants pour maintenir les savoirs traditionnels de la communauté.	Maintenir, par aire de trappe, des peuplements de bouleau à papier adéquat pour assurer la poursuite de l'artisanat.
7	Accès au territoire.	Les nouvelles voies d'accès au territoire augmentent la fréquentation des nouveaux utilisateurs ce qui risque de détériorer les sites sensibles et diminuer la qualité de la chasse autochtone.	Participer au plan de gestion des voies d'accès.	

No.	Valeur/Sujet	Préoccupation	Enjeux	Objectif
8	Vieilles forêts.	Les vieilles forêts font partie de notre culture et façonnent identité. Leur disparition aurait des impacts importants sur notre « garde-manger » et la transmission des savoirs traditionnels.	Disparition des vieilles forêts.	Maintenir, par aire de trappe, un % adéquat de vieilles forêts.
9A	Maintien de la qualité de l'eau souterraine (VO Table locale GIRT de Rouyn-Noranda).	Les activités forestières mécanisées, réalisées sur eskers et moraines sont susceptibles de modifier la recharge par l'augmentation du ruissellement en surface, une diminution de la capacité d'absorption du sol ou une diminution de la capacité de filtration causée par la compaction du sol, un enlèvement du sol organique/végétal et/ou du sol minéral et l'orniérage.		Limiter la superficie occupée par les chemins forestiers carrossables implantés sur les eskers identifiés.
9B	Maintien de la qualité de l'eau de surface (VO Table locale GIRT de Rouyn-Noranda).	La récolte forestière est susceptible d'augmenter les débits de pointe des cours d'eau, entraînant la dégradation de la qualité de l'eau et la perturbation de l'habitat faunique des milieux récepteurs par une augmentation, entre autres, de l'apport en matière en suspension et en nutriments dans l'eau.		Protéger l'habitat faunique des bassins versants identifiés comme fragiles. Protéger la qualité de l'eau des lacs servant de source d'eau potable.
10	Programme de participation autochtone (PPA).	Les délais importants et récurrents entourant l'émission du PPA par le MFFP ne permettent pas de soutenir adéquatement la communauté financièrement de façon continue et laissent cette dernière sans processus de consultation valide.		Améliorer les délais entourant l'émission du PPA par le MFFP. Celui-ci devrait être valide au 1er avril de chaque année, soit au début de l'année financière.
11		L'investissement en sylviculture du gouvernement sur les terres publiques peut avoir une influence sur les revendications globales de la communauté ainsi que sur la mise en place d'aires protégées.		

Appendix E – Table of degrees of alteration of the age structure

		Old-growth forests (100 years and over) (%)				Young forests (less than 20 years) (%)			UTA Alteration level	
NO_MU	**NO_UTA**	Natural proportion	Low level limit	High level limit	Actual proportion	Low level limit	High level limit	Actual proportion	**Actual**	**Target**
08652	**08652_UTA1**	49,0	24,5	14,7	24,8	25	35	15,2	LOW	MODERATE
08652	**08652_UTA2**	49,0	24,5	14,7	3,1	25	35	27,2	HIGH	MODERATE

Appendix F – Derogation from the spatial organization in fir trees for certain UTRs of MU 085-51, 086-52 and 087-51

Derogation from the spatial organization in fir trees for certain UTRs of MU 085-51, 086-52 and 087-51

Ministère des Forêts, de la Faune et des Parcs

Direction de la gestion des forêts Nord-du-Québec

15 mars 2018

Auteure

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Pour plus de renseignements

Ministère des Forêts, de la Faune et des Parcs

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Référence : Ministère des Forêts, de la Faune et des Parcs (2018). *Dérogation à l'organisation spatiale en sapinière pour certaines UTR des UA 085-51, 086-52 et 087-51,* Québec, gouvernement du Québec, Direction de la gestion des forêts du Nord-du-Québec, Secteur des opérations régionales, 14 p.

Liste des acronymes

CPRS	Cut with protection of regeneration and soils
LADTF	Sustainable Forest Development Act
RADF	Sustainable forest management rules
CMO	Mosaic cutting
UTR	Reference territorial unit

Introduction

The Nord-du-Québec region is overwhelmingly in the bioclimatic domain of the spruce moss forest. Three MUs in the region are therefore set up following the rules of spatial organization in the spruce forest[17]. A small part of each of these three AUs (just over 300,000 ha in all) is located at the northern limit of the bioclimatic domain of fir trees. The approach of spatial organization of the spruce forest has been applied there for several years, since the forest characteristics of the territory are typical of the area of the spruce moss forest.

In order to continue the management of these forests in the most appropriate way, it is necessary to derogate from the articles of the *Sustainable forest management rules*[18] (RADF) applicable to the bioclimatic domain of fir trees. Under section 40 of *the Sustainable Forest Development Act* [19] (LADTF), the Minister of Forests, Wildlife and Parks may authorize a departure from regulatory standards if the proposed alternative measures provide equivalent or better protection of forest resources and the environment.

Thus, by virtue of this article 40 of the LADTF, the present document defines the protection measures replacing the articles.

Inside this document explaining the nature of the exemption, it will be explained:

1. The imposed substitution approach;
2. The places where the imposed substitution approach will apply;
3. Regulatory standards subject to substitution;
4. The monitoring mechanisms planned to ensure the application of the imposed substitution approach;
5. The fines provided for in the event of an infringement.

[17] Correspondant aux articles 144, 145 et 146 du RADF et décrits plus en détail dans les cahiers sur les enjeux écologiques liés à l'organisation spatiale des forêts dans la pessière à mousses (MFFP, 2017).
[18] Le RADF en ligne http://mffp.gouv.qc.ca/les-forets/amenagement-durable-forets/reglement-sur-amenagement-durable-des-forets-du-domaine-de-etat/
[19] La LADTF est disponible en ligne : http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=2&file=/A_18_1/A18_1.html

1) Demonstration of the septentrional character of the forest populating the UTRs concerned

The TRUs comprising the majority of their area in the bioclimatic domain are presented in Figure 1 and listed in Table 3. These TRUs are located at the northern limit of the bioclimatic domain. Moreover, we can see in Figure 2 that these are found in a homogeneous unit specific to the spruce forest (ROEm).

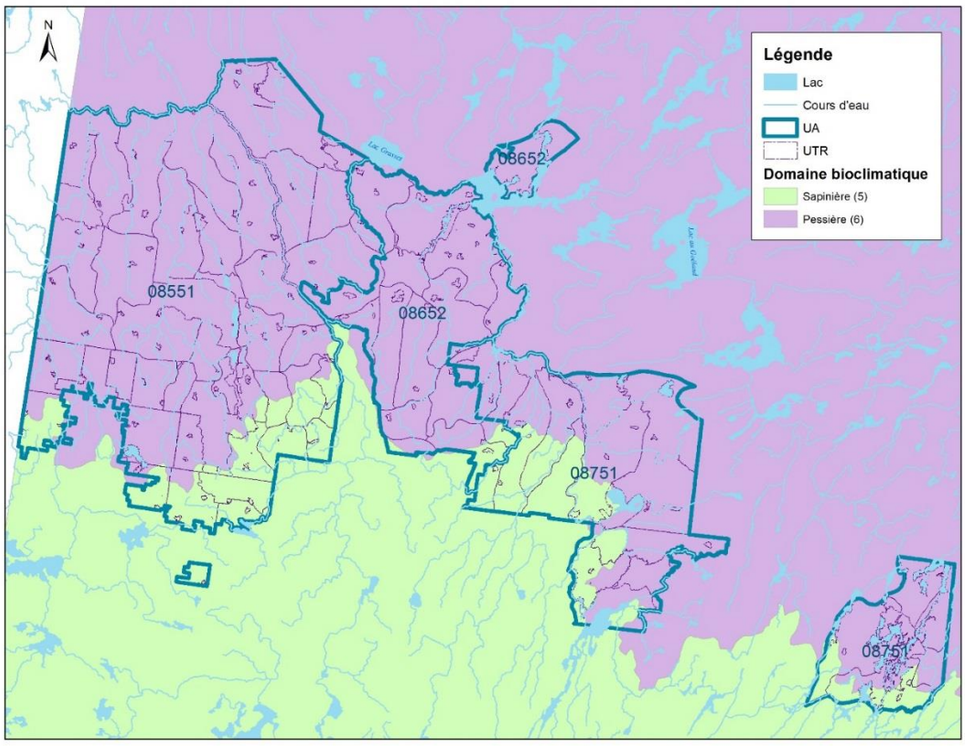


Figure 1. Map of MU, UTR and bioclimatic domains.

The northern character of the UTRs covered by the exemption can be seen by observing the dominant species of these territories (**Table 1**). Forest stands dominated by balsam fir cover on average only 3.2% of the territory. Stands dominated by black spruce or jack pine cover an average of 60% of all these UTRs.

Table 2. Distribution of the dominance in species of forest stands (removing the types without cover). Average of UTRs in the fir forest domain, per MU.

MU	Black spruce (%)	Jack pine (%)	Other softwoods (%)	Balsam fir (%)	Intolerant hardwoods (%)
085-51	47,0	14,5	10,8	1,7	26,0
086-52	70,7	6,0	13,5	0,7	9,1
087-51	47,7	9,1	11,7	4,9	26,6
Overall average	**47,8**	**11,9**	**11,3**	**3,2**	**26,0**

In more detail, we can see that only two TRUs out of nineteen have more than 10% of their stands dominated by balsam fir (**Table 2**). Even in these cases, black spruce dominates 59 and 60% of the stands, respectively.

Table 3. Distribution of the dominance in species of forest stands (removing the types without cover).

ID UTR	Black spruce (%)	Jack pine (%)	Other softwoods (%)	Balsam fir (%)	Intolerant hardwoods (%)
085512010	47,9	16,5	5,6	2,2	27,7
085512020	67,2	6,4	8,6	2,5	15,3
085512030	65,9	2,0	4,5	3,8	23,9
085512040	55,3	10,0	14,8	1,7	18,2
085512050	41,7	15,6	11,1	0,8	31,0
085512450	58,9	9,8	7,8	12,1	11,5
085513090	43,5	23,1	18,7	0,3	14,4
085513100	47,5	9,8	14,0	0,4	28,3

ID UTR	Black spruce (%)	Jack pine (%)	Other softwoods (%)	Balsam fir (%)	Intolerant hardwoods (%)
085513110	36,9	29,5	5,4	0,4	27,9
085513200	31,0	16,3	13,3	0,7	38,6
085513210	29,6	18,4	3,5	4,3	44,3
085513220	18,9	25,7	5,4	0,3	49,6
086523150	70,7	6,0	13,5	0,7	9,1
087512010	60,1	2,1	7,6	13,7	16,5
087513070	59,1	7,6	5,9	4,2	23,3
087513080	48,3	9,1	11,7	1,7	29,2
087513100	38,3	10,3	13,2	4,3	33,9
087513140	39,5	8,3	13,8	6,3	32,1
087513200	55,8	15,7	13,3	1,5	13,8
Overall average	**47,8**	**11,9**	**11,3**	**3,2**	**26,0**

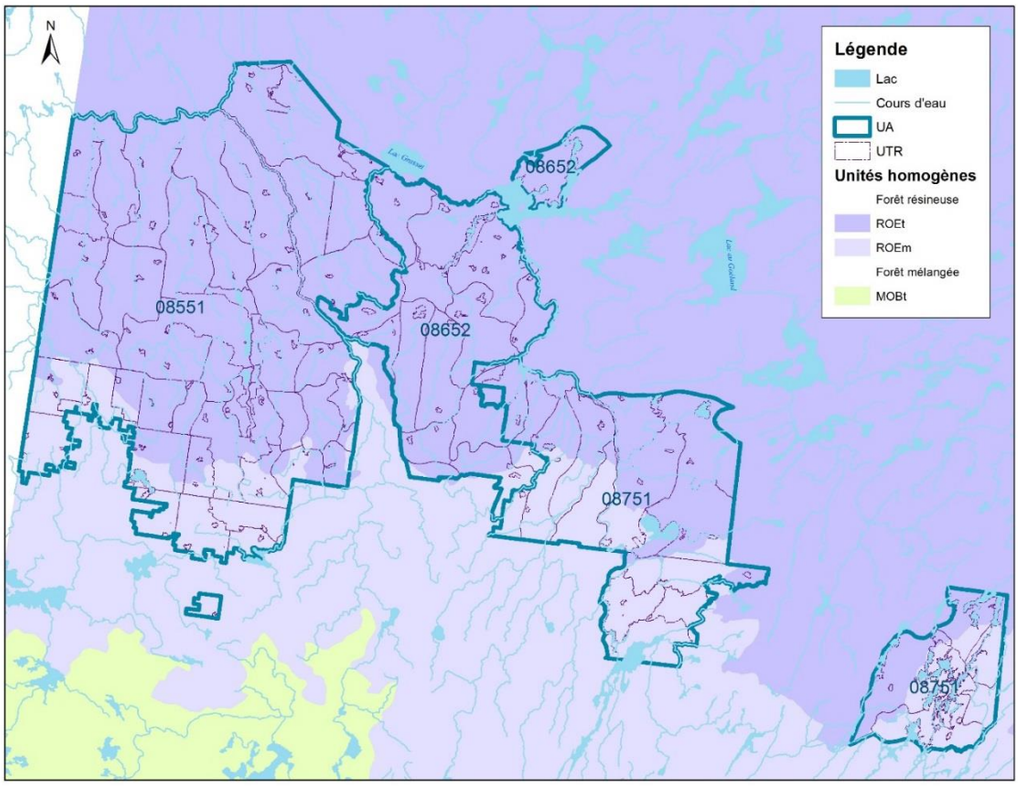


Figure 2. Map of MU, UTR and homogeneous vegetation units.

2) The place where the substitution approach to impose will apply

The substitution approach to be imposed will apply to certain UTRs of the following three management units (MU): 085-51, 086-52 and 087-51, which are located in the Nord-du-Québec region (**Table 3**). These UAs are located between latitudes 48º 33 '36" N and 50º 9' 36" N, and longitudes 75º 31'12" W and 79º 31' 12" W. The areas affected by the exemption are listed in Table 3.

Table 4. Territorial reference units, the majority of whose area is in the bioclimatic domain of fir.

MU	ID UTR	Area in bioclimatic fir forest area (ha)	Total area (ha)
085-51	085512010	11 168	14 359
085-51	085512020	18 210	21 984
085-51	085512030	8 942	8 942
085-51	085512040	16 912	16 912
085-51	085512050	15 084	22 420
085-51	085512450	4 734	4 734
085-51	085513090	14 393	15 918
085-51	085513100	14 441	14 441
085-51	085513110	9 076	9 076

MU	ID UTR	Area in bioclimatic fir forest area (ha)	Total area (ha)
085-51	085513200	12 607	18 751
085-51	085513210	2 931	2 931
085-51	085513220	5 950	8 183
086-52	086523150	3 827	6 331
087-51	087512010	15 003	21 923
087-51	087513070	8 648	8 648
087-51	087513080	20 665	35 148
087-51	087513100	23 880	25 729
087-51	087513140	14 797	29 449
087-51	087513200	17 805	26 282
Total		239 075	312 162

3) L'approche de substitution imposée

The proposed approach is to apply the specific provisions of the RADF concerning the spatial organization of cuts applicable to the bioclimatic domain of the spruce moss forest (articles 144, 145 and 146), in the southern portions of the MU located in the bioclimatic domain of the white birch fir-tree.

The portrait of the UTRs presented in section 1) clearly demonstrates that these UTRs have the characteristics of the spruce-moss stand. In addition, this approach has been applied in these territories since 2008 for MU 085-51 and since 2013 for MU 086-52 and 087-51.

Tableau 5. Approche de substitution.

Substitution standard	Subject
Articles 144, 145 and 146 of RADF	Spatial organization of the spruce moss harvest (cluster agglomerations and forest stands).

4) Regulatory standarts subject to the imposed substitution approach

These are Section II, "Special provisions applicable to the bioclimatic areas of the mapple and fir forest", namely articles 133 to 143 of the RADF.

5) The follow-up mechanisms provided to ensure the application of the imposed substitution approach

Checklists including all the imposed substitution methods must be completed by the managers. These checklists will notably make it possible to verify that the targets targeted by the proposed intervention distribution model have been reached. These checklists are available on the Sharepoint NRF-SGE-AFD website at the following address:
http://wss/intranet/NRF-SGE-AFD/SGEAFD/4_Planification_forestiere_et_ses_consultations/Documents%20controles_SGE-ADF/EM_Liste_des_elements_a_verifier_PAFIT_PAFIO_org_spatiale_pessiere.xls

6) The fines provided for infringement

As the standards provided for the spatial distribution in the spruce forest will apply to the area covered by the exemption, the associated penal provisions will be used in the event of non-compliance with the standards imposed (numbering in conjunction with Annex B. RADF articles as part of the substitution approach). Thus, any person having the right to carry out a forest management activity or the third party to whom this person has entrusted the carrying out of this activity who contravenes one of the provisions of articles 145 and 146 commits an offense and is liable to fine provided for in paragraph 4 of section 245 of the Sustainable Forest Development Act (chapter A-18.1).

7) References

Ministère des Forêts, de la Faune et des Parcs (2017). *Intégration des enjeux écologiques dans les plans d'aménagement forestier intégré de 2018-2023, Cahier 3.1.1 – Enjeux liés à la planification tactique de l'organisation spatiale des forêts dans la pessière à mousses*, Québec, Gouvernement du Québec, Direction de l'aménagement et de l'environnement forestiers, 43 p. [Publié dans l'intranet du Ministère].

Annex A. RADF ARTICLES COVERED BY THE DEROGATION

Chapter VI - Distribution of forest operations and residual forest
Section II - Special provisions applicable to the bioclimatic areas of the maple and fir stands

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

1° have a size less than or equal to 25 ha over at least 70% of the area harvested according to this type of cut;
2° have a size less than or equal to 50 ha over at least 90% of the area harvested according to this type of cut;
3° be less than or equal to 100 ha over 100% of the area harvested according to this type of cut.

134. In the management units or in the reference territorial units located in the bioclimatic areas of the fir forest referred to in Appendix 1, the total cutting areas must:

1° have a size less than or equal to 50 ha over at least 70% of the area harvested according to this type of cut;
2° have a size less than or equal to 100 ha over at least 90% of the area harvested according to this type of cut;
3° have a size less than or equal to 150 ha over 100% of the area harvested according to this type of cut.

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

136.« A solid woodland edge must be kept between the total cutting areas other than mosaic cutting, until the regeneration of the cutting areas has reached an average height of 3 m. The wooded edge between two cutting areas must be at least 60 m wide when each cutting area covers an area of less than 100 ha or a minimum width of 100 m when one of these two cutting areas cutting covers an area of 100 to 150 ha.

This wooded edge must consist of trees, shrubs or brush more than 3 m high and must serve in particular as a visual screen and corridor for the movement of wildlife.

It is forbidden to circulate with a forest machine in this wooded edge, except when building or improving a road».

137. «Any total cutting is prohibited in the wooded edge referred to in article 136 until regeneration is established in the cutting areas in accordance with the first paragraph of this article.

Partial cutting is permitted over 25% of the total length of the forested edges referred to in article 136 included in a management unit or in another forest territory in the domain of the State. However, the wooded edge being partially cut between two total cutting areas must be at least 75 m wide when each cutting area covers an area less than 100 ha or a minimum width 125 m when one of these two cutting areas covers an area of 100 to 150 ha. After partial cutting, the wooded edge, which must serve as a visual screen and corridor for the movement of wildlife, must be composed, per hectare, of at least 1,500 living stems of standing commercial species with a diameter 2 cm or more measured at a height of 1.3 m from the highest ground level.

To make the partial cut referred to in the second paragraph, the clearing of logging or skidding trails must be carried out on a width less than 1.5 times that of the forest machine used.

However, the construction or improvement of a road which crosses the wooded edge is permitted insofar as the clearing carried out for this purpose does not exceed the width of the right of way provided for in Schedule 4 for the class of road to which it belongs. »

138. «The cutting areas of a mosaic cut must be of variable area and shape.»

139. «The residual forest of a mosaic cut must have the following characteristics:

1° have, within the limit of the mosaic harvest site, an area at least equivalent to that of the cutting areas of a mosaic cut;
2° be at least 200 m wide;
3° be made up of at least 80% of forest stands 7 m or more in height and, in a proportion not exceeding 20% of its area, of forest stands of 4 m to less than 7 m height;

4° be made up of stands with a forest cover density greater than 40% over at least 80% of its area and 25 to 40% over its remaining area. It can also be made up of stands with a forest cover density of 25 to 40% over more than 20% of its area, provided that this proportion is equal to or less than that of stands with such a density and which are located in forests. 7 m or more in height from the mosaic harvest site before intervention;
5° be made up of forest stands that are capable of producing commercial species a volume of raw merchantable wood at maturity of at least 50 m^3 / ha or, when they are unable to produce such a volume, be made up forest stands equivalent in composition and area to those harvested;
6° consist of forest stands belonging at least 20% to the same type of forest cover as those harvested;
7° not to have been the subject, during the last 10 years of harvest, of a commercial harvest other than a silvicultural treatment referred to in the second paragraph of article 142».

140. «Each mosaic harvest site must be indicated in the integrated forest management plan. The same is true of the residual forest of a mosaic cut.

Once indicated on the plan, the residual forest of a mosaic cut cannot be used again as residual forest as long as the harvest cannot be carried out in accordance with the provisions of the first paragraph of article 142».

141. «A forest area composed of trees, shrubs or brush with an average height of 3 m or more must be kept on the periphery of a cutting area of a mosaic cut. Its width must be at least 200 m or at least 100 m if the cutting area is less than 25 ha.

The first paragraph does not apply to the part of the perimeter of a cutting area adjacent to a wooded edge conserved on the edge of a lake or watercourse whose width, measured at the upper limit banks, exceeds 35 m.

A forest area composed of trees, shrubs or brush with an average height of 3 m or more and a width of at least 200 m must also be kept between a residual forest and the cutting areas of a mosaic cutting as well as between a residual forest and other areas of total cutting, to serve as a corridor for the movement of wildlife.
The forest areas referred to in this article must be preserved until regeneration in the mosaic cutting areas reaches an average height of 3 m or more ».

142. «The residual forest of a mosaic cut must be kept within the limit of the harvesting site until it can be harvested. It can only be done after the expiration of a period of 10 years from the date on which the mosaic cut was made or, if the regeneration has not yet reached an average height after this period 3 m, as long as this regeneration has not reached such a height.

The provisions of the first paragraph do not apply to the following silvicultural treatments carried out in a residual forest:

1° a commercial thinning or a gardening cut carried out in accordance with the applicable silvicultural prescriptions;
2° a partial cutting, in a stand of trees having reached its age of maturity or which will reach it in less than 15 years, where one harvests at most 35% of the basement market surface of the stand on the condition however of maintain, after harvest, a basal market area of at least 15 m2 / ha of well-spaced trees, and this, in species and in proportion similar to those of the initial stand.

A residual forest in a mosaic cut may be crossed by a road whose width of deforestation does not exceed the width of the right-of-way provided in Schedule 6 for the class of road to which it belongs or by a course of water whose width at the limits of the riparian ecotone does not exceed an average of 35 m. However, when indicating a residual forest in the integrated forest management plan, neither the area nor the width of the road or watercourse can be considered in the calculation of the area and width of the forest. residual for the purposes of applying paragraphs 1 and 2 of section 139».

143. «During a harvest year, at least 60% of the total area of the total cutting areas of a management unit or other forest territory in the domain of the State must be planned and carried out in accordance with the provisions of the present regulations applicable to mosaic cutting.»

Annex B. RADF articles as part of the substitution approach

Chapter VI - Distribution of forest operations and residual forest
Section III - Special provisions applicable to the bioclimatic area of the spruce moss forest

144. « In the management units or in the territorial reference units located in the bioclimatic domain of the spruce-moss forest referred to in appendix 1, the forest interventions are carried out on the basis of an approach comprising cutting agglomerations and massifs forest».

145. « A minimum of 30% of the productive forest area in residual forest stands of 7 m or more in height must be maintained at all times in an agglomeration of cuts where tree harvesting is carried out and this area must be well distributed in the agglomeration ».

146. « Forest areas must occupy at least 20% of the area of a management unit and be well distributed in the unit».

Appendix G – Foundations of the Economic Profitability Analysis

Full details of the aspects presented here can be found in the economic analysis guide available in French only on the following page: http://bmmb.gouv.qc.ca/analyses-economiques/principes-d-analyse/.

The purpose of an economic analysis is to measure the economic profitability of a specific investment for society; it examines the costs and revenues for all society's economic agents, regardless of who pays and who receives. In other words, economic analysis measures the total well-being or wealth created for society by an investment. It also considers the investment's opportunity cost – in other words, the workers, forest management companies, logging companies, processing companies and the Government.

The opportunity cost is the total of the revenues and costs for the best other option. Opportunity cost is not included in the costs and revenues of the investment being analyzed. In the case of profitability analyses for silvicultural investments, opportunity cost is measured by means of a reference scenario, which is used to measure what the forest would produce if the investment was not made. By applying the notion of opportunity cost, the economic analysis measures the additional wealth created by the investment, as opposed to what the forest would produce without the investment. Obviously, to assess the economic profitability of a silvicultural investment, it is first necessary to identify all its costs. The total cost is the sum of all costs generated by the silvicultural work (planning, application and monitoring) throughout the duration of the investment scenario. The total revenue is basically the revenue generated by all activities in the direct timber production chain, including forest management, logging and processing. Lastly, silvicultural investments may have an impact on ecological, environmental and socio-economic issues, meaning that there may be economic costs or benefits from other resources and forest uses, and from environmental considerations. However, many of these elements are not quantifiable, and if they are, it is difficult to assess the investment's impact on them.

The revenues considered for the analysis are the revenues from timber production and processing:

- ***The MVST (market value of standing timber)*** is the revenue collected by the resource owner, in this case society, for which the State is the manager responsible for selling the resource. It measures the resource's value.
- **The profits of silvicultural, logging and processing companies** is equal to the revenue generated minus their performance and production costs.
- **Salary earnings** measures the difference in wealth or well-being for workers in the silvicultural, logging or wood processing sector as opposed to another economic sector. Specifically, salary earnings are calculated as the worker's net salary (total salary minus opportunity cost), or the opportunity salary obtained elsewhere in the economy.
- **The additional earnings (or adjustment) for quality and quantity variations** following treatment is the additional value obtained as a result of the treatment that is not captured by any other component of economic income. The three components of economic income (MVST, company profits and salary earnings) are mean values assessed from historical data. Because silvicultural investments are intended to improve the quality or quantity of wood harvested, or both, the revenues must be adjusted to reflect the investment's impact on those two aspects.

One of the basic principles of profitability analysis is the importance of the time at which the costs are incurred and the revenues earned. This is due to the natural preference of economic agents to consume now rather than in the future, and to their level of risk aversion. In the profitability analysis, these two elements are addressed by the discount rate, which tends to reduce the value of future costs and income to the benefit of earlier ones. However, when the investment has long-term repercussions that affect several generations, the notion of discount rate must be adjusted to reflect inter-generational equity. Inter-generational equity reflects the desire of the present generation's agents to postpone the positive consequences of their decisions or avoid postponing the negative consequences. This leads to a fair division, between generations, of the cost of and revenues from human activities.

Lastly, several criteria are generally used to assess profitability. Some of these criteria measure a level, some measure a performance, and others compare different sizes and life cycles. The main criteria addressed here are:

- ***Net present value (NPV)*:** NPV measures the investment's net value in today's dollars; in other words, the difference between the discounted income and the discounted costs.
- ***The cost/income ratio (C/I)*:** The C/I ratio measures the gross benefit from each dollar invested, expressed in today's dollars. It is also known as the cost/benefit ratio; in this case, the benefit is the gross income. The ratio is NPV/C-1.
- ***The net present value in perpetuity (NPVP)*:** The NPVP is the investment's total net present value when repeated in perpetuity, or infinitely. It is used to compare investments with different life cycles.

For each of these decision criteria, the final measure used to identify the additional wealth created by the investment must be assessed from its divergence from the reference scenario (opportunity cost). For example, the economic NPV of a planting scenario would be the planting NPV minus the reference scenario (natural forest) NPV. Each criterion measures profitability in terms of level or performance, and can be used to differentiate between projects of different sizes or durations, but not projects of different sizes and durations.

The economic profitability analysis identifies a wealth indicator that can then be used to compare scenarios of different sizes *and* durations from the reference scenario. **To do this, the "Difference between NPVP/scenario cost" ratio is the indicator used to rank the investment scenarios individually.** It allows users to:

- Identify the additional net income in perpetuity, compared to investment costs;
- Compare investments with different life cycles;
- Compare investments of different sizes.

This indicator, known as the economic indicator or EI, is used to determine the relative economic profitability of scenarios compared to their own reference scenario. When the indicator is positive, the scenario under analysis is economically more interesting than the reference scenario. In addition, the higher the indicator, the more preferable the scenario is to one with a lower value. If the indicator is negative, it is preferable, from an economic standpoint, not to implement the scenario. However, it is also important to understand that a scenario with a negative indicator may still be a good silvicultural choice because it meets other goals, for example ecosystem-based management. It can be difficult, if not impossible, to quantify the economic costs and benefits of other resources and forest uses, and of environmental considerations. In a comparative analysis, the highest economic indicator denotes the scenario that creates the most wealth for society per dollar invested. The economic indicator can also be used to rank and compare all the scenarios being analyzed, regardless of their characteristics and location and the characteristics of the natural forest.

INPUTS USED FOR ECONOMIC PROFITABILITY ANALYSES

The data used is the same as that of the chief forester's office for the calculation of the 2018-2023 allowable cut. This facilitates the work and allows feedback with the chief forester for his calculation. Furthermore, these data (groups of strata, scenarios, yield curves, etc.) will require adaptations to improve the accuracy of the economic analysis, since at first glance on board, they were not designed for this purpose. This adaptation work was not done before the filing of PAFIT. In this context, the results of the economic analysis are too preliminary and are not presented in this PAFIT.

Despite this, the preliminary analyzes bring out certain interesting observations, such as the more precarious profitability of the partial cut scenarios or the replenished scenarios. This information is therefore used at PAFIO to carry out said scenarios in the least risk locations. Developments continue, but even partial, the information is relevant to guide our choices.

Warning regarding the interpretation of results

The results shown are valid only if the non-commercial silvicultural work is carried out properly, with the result that the plantations are able to grow freely. This situation is a prerequisite for achievement of the plantation yield hypotheses.

The analysis does not consider the potential allowable cut effect of high silvicultural intensity scenarios. This effect may occur where thinning or final cut volumes occur quickly and satisfy short-term stock deficits.

Scarcity or abundance of wood, the range of products offered, the ease with which the wood can be sold and historical variations in wood prices (financial risk aversion), depending on the species or product class, or both, must also be considered and will affect the anticipated financial profitability of a silvicultural investment in terms of the choice of species or wood production priority goals, and ultimately the hope of making a financial profit.

Limits of MERIS

The **discount rate** used in MERIS is a combined rate set at 4% for the first 30 years, and then reduced. If the proposed discount rate is changed for the economic analysis, the results of all the simulations will have to be reviewed, as will the conclusions drawn.

The profitability analysis performed with MERIS does not include all the values associated with the development objectives, such as protection of landscapes or biodiversity and the maintenance of wood flows, since it is difficult, if not impossible, to quantify their value. It is therefore possible for a silvicultural scenario's economic profitability to be negative, but for the scenario to be included in the development strategy because it satisfies other objectives that are difficult to quantify from an economic standpoint.

It is important to note that, when **pruning** is simulated with MERIS, it does not increase the scenario's income, first because it does not increase the plantation's volume or DBH yield, and second because it does not create added value in terms of tree quality. This may suggest that pruning only makes a negative contribution to scenario profitability. However, in the simulations, this study maintains the MERIS hypothesis that pruning does not generate added value for the wood harvested because, in fact, the current market does not pay higher prices for knot-free structural wood.

MERIS adjusts the revenue from wood harvested either positively or negatively, depending on diameter, to reflect variations in wood quality and quantity. In the North American lumber market, given the presence of composite structural products able to replace larger lumber, **large lumber items** do not necessarily have added value over 2 x 4s. Contrary to what one would think, processing of large-diameter logs therefore does not automatically generate more profit. In addition, sawmills are equipped to deal effectively with average-sized logs, and large logs are often seen as problems.

Appendix H – Paludification Management Strategy

Management units (MUs) 08551, 08562, 08663, 08664 and 08665 are affected by the issue of paludification. See the internal report of the technical committee on paludification to find out more about the issue and the current state of the region. We assessed the risk of not managing those MUs sustainably based on two elements: accessibility and the paludification level of existing stands (Table 1).

Ecological type, an indicator of paludification level, will affect the success of the field preparation

- For the RE26 ecological type, stands will be susceptible to paludification if what is done does not change the dynamic established with the accumulation of organic matter. Sites need to be prepared so that the decomposition process can start again, which should lead to a sufficient quantity of good microsites. If the site is not prepared, future stands will definitely be less productive, although they may still be commercially viable in the long run.
- The paludification process has taken hold on RE37 and 38 ecological types, where the organic matter is so thick that it could prevent site preparation. However, it should still be possible to create an appropriate number of microsites. Unless the sites are prepared, those stands may never have any commercial value in the future.
- The thickness of the organic matter on RE39 ecological types could compromise operations, and the outcome is far from certain as regards the creation of microsites. Without site preparation, future stands would likely never meet the threshold for forestry potential.

Accessibility to the stands has a bearing on the options available for rehabilitation and the profitability of operations. When a stand is less than 2 km from a gravel road, a hydraulic disk scarifier (T26) or harrow can be used; this is a relatively effective and affordable solution. Site preparation is more expensive on winter roads, because mechanical shovels have to be used for windrowing. Moreover, that kind of site preparation entails a loss of productive area ranging from 30 to 50%, and the outcome for microsites is uncertain. Regeneration of paludified stands cannot depend on natural regeneration, and there are few effective and affordable solutions. For operational reasons, reforestation is limited to sites that are less than 2 km from gravel roads. The Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST) and Rexforêt recommend a maximum distance of only 1 km from gravel roads to ensure that labour standards can be met. Management of caches in winter is extremely risky for plant survival. The risk would be lower for bare-root plants, but the MFFP does not produce those. Seeding also has its limits; good seedbeds are needed and large quantities of premier quality seed must be available. Seed-tree cutting may be a solution in areas on winter roads, but there must be enough seedbeds. According to analyses carried out using MERIS software, silviculture scenarios on RE3 ecological types would not be profitable as a whole, and the profitability of scenarios for RE2 ecological types would depend on whether there was a road nearby.

Locating stands in large areas suitable for woodland caribou has a bearing on the selection of options, because maintaining a suitable habitat is a priority and profitability may be affected if it is decided to close most of the roads after operations have been completed. That element has not been included in the risk assessment.

Table 1. Risk of not managing sustainably based on ecological type and stand accessibility.

	Ecological type		
	RE26	RE37 and RE38	RE39
Accessible	Low	Moderate	High
Not accessible	Moderate	High	Very high

The management strategy will vary depending on accessibility and whether paludified stands are located in woodland caribou habitat areas. All decisions to carry out operations in stands that are already paludified or are likely to become so should take into account the risk of not managing sustainably. On the territory, large concentrations of paludified stands form large sectors that can only be accessed in winter because of the moisture regime, the large percentage of peat bogs and the scarcity of road-building materials. Mapping was done (neighbourhood analysis) to identify paludified areas for which no effective or profitable solution is evident. Table 2 shows the areas included in the calculation of forestry potential, based on the risk for each management unit outside those "solutionless areas."

1. Paludified stands (or stands likely to become paludified) in solutionless areas

These are large sectors with concentrations of paludified stands that can only be accessed in

winter because of the moisture regime and the scarcity of road-building materials. Operations in these areas would fall below the profitability threshold and would be almost impossible to carry out from an operational standpoint. Ideally, no forestry operations should be carried out in these areas until all operational solutions have been reviewed. A large percentage of the paludified areas has been withdrawn from the forest harvest for 2018-2023 because of overlap with interim measures for woodland caribou (Table 3). The sectors in the paludified areas that will be harvested in 2018-2023 will be tested or monitored to reduce the uncertainty surrounding these sectors from an operational standpoint.

Table 2. Surface area included in the forestry potential by MU, based on risk of non-sustainable management.

At-risk area (ha)	Management unit							Total
	08551	08562	08652	06363	08664	08665	08666	
Very high	37,864	1,390	3,269	14,106	9,597	16,784	109	83,118
High	88,196	660	21,279	12,512	17,690	18,945	134	159,415
Moderate	92,011	473	40,769	21,295	21,695	49,024	189	225,456
Low	44,348	204	12,961	7,128	19,028	12,845	42	96,556
Total	262,419	2,726	78,278	55,041	68,010	97,598	474	564,545
Surface area accessible and treatable	113,481	249	51,326	9,897	29,270	31,425	115	235,763
Ratio to be treated	43%	9%	66%	18%	43%	32%	24%	42%

Table 3. Overlap of paludified areas with interim measures for woodland caribou, by MU.

Management unit	08551	08562	08652	06363	08664	08665	08666
Overlap (%)	95	100	51	87	5	45	74

2. Paludified stands (or stands likely to become paludified) that are accessible and located outside caribou habitat

Since they are already accessible, these stands must be rehabilitated (scarification and reforestation) because there is less uncertainty about how efficient the scenarios will be. Scarification (once or twice) can be done by T26 or by harrow, depending on the site. Harrows are more efficient on sites where the organic matter is thicker (Table 3), and they can also reduce encroaching ericae. They should therefore be the first choice in most cases. Reforestation should be at the level of 2,000 stems/ha to reshape the forest cover as quickly as possible; this will give the stands a competitive advantage over sphagnum and other mosses. Trembling aspen (PET) stems should be maintained when the species is already on a site (to a maximum of 30 to 40% of the basal area). A certain amount of tamarack (MEL) can also be used for reforestation, particularly on moist sites. It should be noted that there is still some uncertainty around whether RE3 sites can be reforested. Those sites will probably not yield as much as the growth curves predicted in the Chief Forester's calculations for 2013-2018. The primary goal of the treatment is to bring stands back to commercially viable levels (over 50 m³/ha).

3. Paludified stands (or stands likely to become paludified) that are accessible and located inside caribou habitat

Hardwood species should not be encouraged inside woodland caribou habitat, and the construction of new access roads is not desirable because the aim of the strategy is to disrupt the natural habitat as little as possible. These stands should be put back into production (scarification and reforestation, see section 2), since they are already accessible. The scenario involving maintenance of trembling aspen stems should not be selected.

Table 4. Types of scarification possible for paludified stands or stands likely to become paludified.

Types of scarification	Efficiency in relation to the thickness of the organic matter			
	0–20 cm	20–40 cm	40–60 cm	Over 60 cm
TTS	x			
T26	x	x	x	
Harrow	x	x	x	
Winter clearing with hydraulic shovels and comb harrows	x	x	x	x

Greyed-in boxes represent inefficient scenarios (sources: Henneb et al. 2015, Larouche 2016 (internal report)).

4. Paludified stands (or stands likely to become paludified) that are inaccessible and located inside caribou habitat

Innovative solutions are needed for these stands, but they cannot entail large investments since most of the roads will be closed after the harvest and rehabilitation operations. The best way to access these stands would be to construct winter roads, either groomed and developed or not. Sites will therefore have to be prepared in winter. Ideally, the site should be prepared at the same time as the harvest, to minimize road maintenance costs. Winter clearing seems to be a good solution, even though it will reduce the productive area in the medium term. The site could be reforested by maintaining seedbeds or sowing manually (with shakers) in spring if grooming was planned when the winter road was built. Manual or aerial seeding by helicopter is also a possibility for large areas. However, there are not many quality seeds available at the moment, and that could compromise the completion of treatment.

5. Paludified stands (or stands likely to become paludified) that are inaccessible and located outside caribou habitat

Planners will need to decide whether it is strategically useful to build access roads for harvest and rehabilitation of these stands, depending on where they are located and the productivity and maturity of neighbouring stands. If the choice is to build, the most efficient solutions could be selected (scarification and reforestation) but only with the investment needed for a Class 4 or 5 road (not a winter road). Thrift must prevail because, according to the MERIS assessments, that kind of investment will not be profitable for many of the sites concerned. If it is decided not to develop an access road, these stands will follow the silviculture scenario in the forestry potential calculations.

The management options are summarized in Table 5.

Table 5. Silviculture scenarios appropriate for paludified stands or stands likely to become paludified, and uncertainty as to results.

Silviculture scenarios		Accessible outside caribou habitat	Accessible inside caribou habitat	Inaccessible outside caribou habitat	Inaccessible inside caribou habitat	Uncertainty		
						RE26	RE37-RE38	RE39
1	Harvest – Scarification – EPN reforestation	x	x			Low	Moderate	High
2	Harvest – Scarification – EPN-PET reforestation	x				Low	Moderate	High
3	Harvest – Scarification – EPN-MEL reforestation	x	x			Low	Moderate	High
4%	Road building - Harvest – Scarification – EPN planting			x		Low	Moderate	High
5	Road building - Harvest – Scarification – EPN-MEL planting			x		Low	Moderate	High
6	Road building - Harvest – Scarification – EPN-PET			x		Low	Moderate	High
7	Groomed winter road – Harvest - Winter clearing – Spring seeding using shakers			x	x	Moderate	High	High
8	Winter road - Harvest and seedbed maintenance - Winter clearing			x	x	Moderate	High	High
9	Winter road – Harvest – Winter clearing – Aerial seeding			x	x	Moderate	High	High

6. Paludified stands (or stands likely to become paludified) that have already been harvested

A relatively significant area of paludified stands has been harvested since the 1970s, with just a tiny percentage being scarified (Table 5). Stands at high or very high risk were bypassed, despite their contribution to forestry potential, and the rehabilitation efforts did not exceed 5%. That tells us that productive areas have been shrinking since the 1970s, since 40% of very high-risk stands have still not grown to 4 m 40 years after the harvest. MU 085-51 has larger areas because the stands take up so much of the land, which means they cannot be avoided effectively. The paludified harvested area corresponds to about 5% of the area included in the forestry potential calculation. The ratio is closer to 2 or 3% for the other MUs. There needs to be a specific tracking operation to spot rehabilitation possibilities for accessible stands or groups of inaccessible stands. We will have to decide what is the best thing to do to slow the loss of productive areas, while ensuring long-term profitability at the same time. This work can be paced according to the silviculture budgets we are given.

That part of the strategy will not be included in the Issue-Solution sheet until the PAFIT is prepared for 2023-2028.

Table 6. Harvested areas within paludified stands since the start of the industrial harvest, by risk of not managing sustainably, and scarified ratio by risk category.

Management unit	Harvested areas (ha) by risk			
	Very high	High	Moderate	Low
085-51	4,950	25,964	40,876	18,836
085-62	15	55%	25	59
086-52	387	6,352	24,227	4,645
086-63	1,829	3,162	3,982	3,243
086-64	772	2,624	4,362	6,670
086-65	1,004	5,312	14,470	4,331
Scarified ratio	1%	4%	7%	18%

7. Tools

Quick references

Map:
file:///\\se189c\Commun\SecO_Groupe_Travail\BR_DOI\Strategie_prod_bois\Paludification\Comite_paludification\CA_2019-09-25_Type_eco_Palu.jpg

ArcGIS project:

file:///J:\BD_GEOM\Projet_Commun\Production_de_bois\Paludification\20190830_Palu.mxd

Paludified stands or stands likely to become paludified (RE26, RE37, RE38, RE39) by zone (in paludified or unpaludified areas, in territories covered or not covered by the caribou strategy, accessible or inaccessible) for the MUs concerned. J:\BD_GEOM(SE185b)\Projet_Commun\Production_de_bois\Paludification\TypEco_Palu_acces_caribou.shp

See the fields:

- Access (Yes: 2 km or less from a gravel road)
- Caribou (Yes: in the territories covered by the caribou strategy)
- PaysaPALU (Yes: in a paludified area that will be removed from the Forest Plan in 2023 – Confidential for the moment)

Appendix I - Steps planned for the implementation of AIPLs

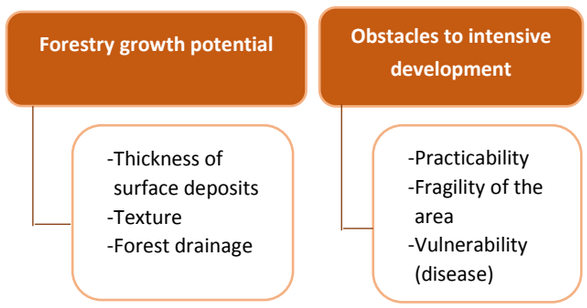
A number of steps are planned for the implementation of AIPLs

Cartographic identification of forestry growth potential

The region's forests have good potential for high-yield wood production. In this context, the first step consists in pointing out the areas that present the highest potential for intensive silviculture.

To that end, they must show above-average growth potential and few operational constraints.

A biophysical model has been developed for cartographic identification of forestry potentials. This model is based on the unique features of the sites: the forestry growth potential and obstacles to intensive development.



The result is a rough map presenting the forestry potential of each ecoforest polygon.

Areas protected from development and certain intervention-free management approaches have been removed from this map.

Location of potential AIPLs by the MFFP

To create a pool of candidate areas (that are sufficiently large) for AIPLs, pooling procedures must be prepared for locations in which wood production is favourable and there are few constraints. In addition, macro-zoning will be used in the area to identify and classify areas that are sufficiently close to the region's processing plants. These potential AIPL pools have been presented to Indigenous communities and to the TLGIRT for public consultation.

Consultation of appropriate regional bodies and Indigenous communities

After the required consultations have taken place, the appropriate regional body and the Indigenous communities concerned propose the areas they wish to see prioritized for wood production to the minister.

These proposals are considered in the process leading to the development of PAFITs.

Identification of AIPLs in the next PAFIT (2023–2028)

The Direction de la gestion des forêts analyzes the comments from previous steps and, in the next PAFIT, identifies the areas that will be subject to high-yield wood production. The forest development activities to be carried out in the AIPLs will be stipulated in the PAFIO.

Entering AIPLs in the AIPL register

The Direction de la gestion des forêts sends the locations of the AIPLs indicated in the PAFIT to the Direction de la gestion de l'information forestière (DGIF), which ensures compliance and works with the Direction de l'aménagement et de l'environnement forestiers (DAEF) to create and update the AIPL register, as provided for in the *Sustainable Forest Development Act*.

Recording AIPLs in the PATP

The AIPLs indicated in the PAFIT are subject to a process carried out by the Table de concertation gouvernementale sur l'affectation du territoire public en région in which they are assigned, if applicable, a government orientation in the PATP, i.e. an intention, a purpose and specific objectives. During this process, the AIPLs proposed are evaluated in light of other interests, orientations, objectives and concerns with an overall aim of consistent use across the territory and the prevention of conflicts over use.

Appendix J – Issues and Solutions Sheets Nord-du-Québec Region

Issues and Solutions Sheets

Objective number : 1.01.1

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

Management unit(s) : 086-52

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	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.A	Indicator type:	Status indicator

Indicator: Gap between the current and historical proportion of mixedwood and hardwood stands.

Scale: Management unit

Indicator clarifications: This indicator is intended to measure the gap between the current forest composition and the natural forest composition. It provides information on the changes caused by forest management and helps us to identify whether or not actions are required to counter hardwood encroachment in the management unit.

Useful definitions: Information on natural disturbance cycles, homogeneous units and the percentage of old-growth forests in the natural landscape can be found in the Reference Status Register (registre des états de référence, only available in French).

Frequency: Ten-yearly

Breakdown by: Management unit

Reference: Maintaining the current proportions of hardwood stands.

Deviation: ± 5% from historical level

Target and results for each MU

MU 086-52	Target	Maintaining the current proportions of hardwood stands.	Deviation	5 %

Reference period	Value	Evaluation
4th inventory forest maps	8,0 %	Red

Information on target: In this case, the target is a reference status used to identify differences between the natural forest and the managed forest.
When the result is significantly different from the target, it is important to make an additional effort to halt hardwood encroachment within the area. A difference of more than 5% is significant.

Timeframe: Not applicable.

Documentation: Notebook on composition issues:
https://mffp.gouv.qc.ca/wp/content/uploads/Cahier_4.1_Composition_vegetale.pdf
Reference Status Register:
https://mffp.gouv.qc.ca/publications/forets/connaissances/recherche/BoucherYan/Memoire161.pdf
Research notice on the impacts of fire and logging on forest composition:
https://mffp.gouv.qc.ca/publications/forets/connaissances/recherche/BoucherYan/Avis90.pdf

Indicator monitoring program:

When the new ten-year inventories are filed, the difference (%) between the percentage of hardwood stands in the area (measured with the ten-year inventory) and the Reference Status Register will be recalculated.

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 086-52 Target 60% Deviation 0 %

Reference period	Value	Evaluation
Review 2013-2018	135,0 %	Green
	76,0 %	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.

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 : Dave Levasseur

Approved by : Isabelle Fortin Date : 2019-08-27

Objective number : 1.01.3

Name of objective : Maintaining or increasing white spruce abundance

Management unit(s) : 086-52

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

Chosen strategy and expected effects

1 . Reforestation or fill planting with white spruce

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

2 . Irregular shelterwood cut

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

3 . CPRS with retention by clumps

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

Significant activities for the implementation of the strategy:

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

Issues and Solutions Sheet prepared by : Dave Levasseur

Approved by : Isabelle Fortin Date : 2019-08-27

Objective number : 1.02.1

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

Management unit(s) : 086-52

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 (1.09.1).

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 . 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.

3 . 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

4 . 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

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 integration zone).	Forest manager	All year long

Indicator number:	1.02.1.A	Indicator type:	Status indicator

Indicator: Ratio of the percentage of current and historical proportion of old-growth irregular stands.

Scale: Management unit

Indicator clarifications: Old-growth stands with irregular structures are stands over 100 years ofage with two age classes (two-storey dominated by 100 year-old trees) or more (old irregular or old uneven-aged).
The indicator must be calculated by first measuring the percentage of irregular old-growth stands in the area. The next step is to consult the Reference Status Indicator to determine the historical percentage of irregular old-growth stands. Lastly, the ratio between these two values is calculated.
The aim of this is to see whether the quantity of irregular old-growth stands is below the quantity in the natural forest.

Useful definitions: Vertical structure: the way the trees are distributed vertically in relation to one another, in a forest stand, based on height or crown class.
Where a stand must be classified using the ecoforest map, the stand's age class is used to assess its structure. Stands associated with a single age class are considered to have a regular vertical structure, and those associated with two or more age classes or classified as young or old-growth stands with irregular structures (JIR or VIR) or uneven-aged structures (JIN or VIN) are considered to have an irregular vertical structure.

Frequency: Ten-yearly

Breakdown by: Management unit

Reference: Between 30% and 50%.

Deviation: The acceptable deviation is included in the target, which is a range (30% to 50%) of the reference status.

Target and results for each MU

MU 086-52	Target Between 30% and 50%.	Deviation	0 %

Reference period	Value	Evaluation
4th inventory forest maps	10,0 %	Red

Information on target: The target is a part of the preindustrial percentage of old-growth forests. Here is how to assess compliance.
Example 1: Currently, 1% of the management unit's productive area is composed of irregular-structured old-growth stands. According to the Reference Status Register, 24% of forests used to have irregular structures. When calculating the indicator, this gives 4.1%, i.e.: (1% / 24%) x 100. There is therefore a difference between the reference status and the current status
Example 2: Currently, 9% of the management unit's productive area is composed of irregular-structured old-growth stands. According to the Reference Status Register, 24% of forests used to have irregular structures. When calculating the indicator, this gives 37.5%, i.e.: (9% /24%) x 100. There is therefore a difference between the reference status and the current status, but it is considered to be acceptable (more than 30% of the original percentage).

Timeframe: Not applicable, because it is a reference indicator.

Documentation: Internal stand structure notebook:
https://mffp.gouv.qc.ca/wp-content/uploads/cahier_5_1_structure_interne.pdf
Reference Status Register:
https://mffp.gouv.qc.ca/publications/forets/amenagement/registre-etatsreference.pdf

Indicator monitoring program:

When the new ten-year inventories are filed, the difference (%) between the percentage of old-growth stands with complex internal structures (measured with the ten-year inventory) and the Reference Status Register will be calculated.

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 FMU.

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 intervention zone (MFFP local office area).
Of all the shelterwood cuts, the irregular shelterwood cut with permanent cover is the form that best allows for sufficient cover and characteristics to be left behind to maintain habitats and mature and old-growth forest characteristics.

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

Frequency: Five-yearly

Breakdown by: Year

Integration zone (groups of MU)

Target: 5%

Deviation: Vary the application of irregular shelterwood cuts between management units while maintaining the 5% for the local office integration zone.

Target and results for each MU

MU 086-52	Target 5%	Deviation	0 %
Reference period		Value	Evaluation
Review 2013-2018		10,0 %	Green
		13,0 %	Green

Information on target: The target is set by integration zone, 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 integration zone 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 : Dave Levasseur

Approved by : Isabelle Fortin Date : 2019-08-27

Objective number : 1.03.1

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

Management unit(s) : 086-52

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

3 . CPRS with retention of large individual stems

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

4 . CPRS with patch retention

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

Significant activities for the implementation of the strategy:

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

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 086-52 Target 40% Deviation 0 %

Reference period	Value	Evaluation
Review 2013-2018	39,0 %	Yellow
	45,0 %	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 40%.

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 086-52	Target 100% of the compartments	Deviation	0 %
Reference period	Value		Evaluation
Review 2013-2018	59,0 %		Red
	86,0 %		Yellow

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.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 : Dave Levasseur

Approved by : Isabelle Fortin Date : 2019-08-27

Objective number : 1.04.1

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

Management unit(s) : 086-52

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).

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 sapling stage habitats (by including the last five years).	Forest manager	All year long

Indicator number:	1.04.1.A	Indicator type:	Performance indicator

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

Scale: Landscape

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

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

Frequency: Yearly

Breakdown by: 6,000 ha hexagons

Target: 100%

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

Target and results for each MU

MU 086-52	Target 100%	Deviation	0 %
Reference period		Value	Evaluation
Year of reference: 2013		96,2 %	Yellow
Year of reference: 2017		98,1 %	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 sylvicultural treatments in Québec:
https://mffp.gouv.qc.ca/publications/forets/entreprises/fiches-aide-decisiontraitement_sylvicole.pdf

Indicator monitoring program:

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

Issues and Solutions Sheet prepared by : Dave Levasseur

Approved by : Isabelle Fortin Date : 2019-08-27

Ministère des Forêts, de la Faune et des Parcs Québec

Issues and Solutions Sheets

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) : 086-52

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 : Dave Levasseur

Approved by : Isabelle Fortin Date : 2019-08-27

Objective number : 1.06.1

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

Management unit(s) : 086-52

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 (obective 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 PAFI-O control list.	Forest manager	Each PAFIO modification

Issues and Solutions Sheet prepared by : Dave Levasseur

Approved by : Isabelle Fortin Date : 2019-08-27

Objective number : 1.07.1

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

Management unit(s) : 086-52

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 (1.09.1), 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 (1.08.1) 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	Summer 2018
2	Identification of critical habitat thresholds and ways of analyzing habitat quality.	Sophie Dallaire	Fall 2019
3	Analyze the quality of the area's habitats and the management strategy's effectiveness in maintaining good quality habitats.	Sophie Dallaire	Fall 2020
4	Identification of solutions to the main issues associated with wildlife species.	Sophie Dallaire	December 2020

Issues and Solutions Sheet prepared by : Sophie Dallaire

Approved by : Marco Trudel Date : 2019-08-27

Objective number : 1.07.2

Name of objective : Contributing to woodland caribou recovery by applying forest management modalities that maintain suitable habitat

Management unit(s) : 086-52

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 help restore woodland caribou populations by applying management methods that foster the maintenance of proper habitats. Woodland caribou live in small, low density groups. The species has little potential for recruitment, and this is one of the factors that limits population growth. However, other reasons have also been given to explain its decline in recent decades, including the significant increase in habitat disturbances. Logging leads to stand rejuvenation and hardwood regeneration. These alterations encourage the presence of predators such as the grey wolf (via moose) and black bear (via small fruit production). Habitat alterations therefore play a role in the decline of woodland caribou populations.
In April 2019, the Québec Government announced the proposed areas to be covered by the woodland caribou strategy currently under preparation. Until the provincial strategy is finalized and implemented in 2023, interim measures have been added to those that are already in place, to allow for large blocks of forest to be maintained.

Connection with other objectives : This objective is linked mainly to the forest age structure objective (1.09.1), the spatial organization objective (1.06.1), the wetland objective (1.08.1) and the hardwood encroachment objective (1.01.1).

Chosen strategy and expected effects

1 . Transitory measures pending implementation of the woodland caribou strategy

These measures, implemented in 2019, consist of protecting areas critical to the conservation or restoration of woodland caribou habitat. Harvesting and road construction or improvement activities are deferred until April 2023.

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Apply the chosen caribou habitat protection strategy.	Forest manager	All year long
2	Adapt forest management strategy for woodland caribou to the local and regional situation.	Woodland caribou management plan responsible	April 2023

3	Calculate the disturbance rate.	Woodland caribou management plan responsible	When preparing tactical plans (PAFIT)

Indicator number: 1.07.2.A Indicator type: Performance indicator

Indicator: Rate of compliance with the modalities planned for woodland caribou habitat.

Scale: Management unit

Indicator clarifications: This indicator is measured to ensure that the rules governing the protection of caribou habitat are upheld. Its purpose is to measure the compliance of plans and reports with the rules in force.

Useful definitions: Habitat of woodland caribou, forest ecotype: The habitat of the woodland caribou, forest ecotype, is defined as a forest area used by the caribou for calving, mating or winter feeding. To be legally protected under the Règlement sur les espèces fauniques menacées ou vulnérables et leurs habitats (Regulation respecting threatened or vulnerable wildlife species and their habitats), the woodland caribou habitat must be identified in a plan drawn up by the MFFP.

Frequency: Yearly

Breakdown by: Management unit

Target 100%

Deviation: None

Target and results for each MU

MU 086-52 Target 100% Deviation 0 %

Reference period	Value	Evaluation
	100,0 %	Green
	100,0 %	Green

Information on target:

Timeframe: None

Documentation: MFFP website for woodland caribou: https://mffp.gouv.qc.ca/la-faune/especes/habitats-et-biodiversite/amenagement-habitat-caribou-forestier/

Indicator monitoring program:

Calculate the indicator for the application of the procedures on a yearly basis.

Issues and Solutions Sheet prepared by : Sonia Légaré

Approved by : Marco Trudel Date : 2019-08-27

Objective number : 1.08.1

Name of objective : Protecting wetlands

Management unit(s) : 086-52

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

Chosen strategy and expected effects

1 . Monitoring of areas under administrative protection

In some management units, areas under administrative protection also provide protection for wetlands, even though they do not count in the 12% protection target. This intermediate level of protection helps to achieve the target.
It is important to make sure this protection continues to apply, in order to fill any gaps. If an administrative protection area changes, the profile must be redone and other protection measures must be introduced to fill the gaps.
If areas under administrative protection continue to be protected, the wetlands in those areas will be adequately protected as well. If the administrative protection is removed, however, it will be necessary to consider other protection measures that would fill the gap and protect the wetlands.

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Monitoring of administrative protection.	Ecosystem management responsible	All year long

Indicator number:	1.08.1.A	Indicator type:	Performance indicator

Indicator: Ratio of protected wetlands compared to the FMU area.

Scale: Management unit

Indicator clarifications: This indicator is used to ensure protection of a sufficient percentage of wetlands in the management unit.
First, it is used to check whether at least 12% of the management unit's wetlands are legally protected (entered in the Register of Protected Areas). If so, protection is adequate.
If not, the indicator measures the quantity of wetlands that should be protected to improve the level of protection given to these sensitive areas. The aim is either to protect at least 12% of the wetlands or to add protection equivalent to 1% of the area of the management unit. The smaller of the two areas is selected.

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

Frequency: Five-yearly

Breakdown by: Management unit

Target: 1% of the MU territory, in addition to protected areas (up to 12% of protected wetlands).

Deviation: None

Target and results for each MU

MU 086-52	Target	1% of the MU territory, in addition to protected areas (up to 12% of protected wetlands).	Deviation	0 ha

Reference period	Value	Evaluation
PAFIT 2018	35 112,0 ha	Green

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

Timeframe: No timeframe is required in this management unit because the target has been achieved.

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

Indicator monitoring program:

The indicator must be monitored each time a tactical plan is prepared, as and when changes are made to administrative protection measures, or when a new ecoforest map is prepared.

Issues and Solutions Sheet prepared by : Sophie Dallaire

Approved by : Marco Trudel Date : 2019-08-27

Objective number : 1.09.1

Name of objective : Minimizing gap between managed and natural forests - forest age structure

Management unit(s) : 086-52

Criteria :	Biological diversity
Issue (value) :	Forest age structure
Issue clarification :	Age structure refers in particular to the depletion of old-growth forests and the over-abundance of stands undergoing regeneration. The forest age structure is defined as the relative percentage of stands in different age classes, measured over a fairly large area (hundreds or thousands of square kilometres). In the natural forest, the age structure is determined mainly by the natural disturbance patterns specific to each region. Regions in which severe disturbances are frequent generally have a lower percentage of old-growth forests and more forests undergoing regeneration. Because the percentage of the different age classes is an important feature of forest ecosystems and is also likely to have a significant impact on biodiversity and environmental processes (e.g. the carbon cycle), it is important to take it into account when planning a forest management strategy.
Objective :	Ensure that the age structure of managed forests is similar to that of natural forests. This is done by limiting the percentage of forests undergoing regeneration and maintaining an acceptable percentage of old-growth forests.
Connection with other objectives :	This objective is connected mainly to the objective of maintaining old-growth forests with irregular structures (1.02.1) and the objective of maintaining species sensitive to forest management (1.07.1).

Chosen strategy and expected effects

1 . 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.

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 . 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

4 . Development and implementation of an age structure restoration plan

An ecological restoration plan is needed when ministerial targets for low to moderate levels of alteration within UTAs are not achieved. The following management objectives must be considered when preparing a restoration plan:
-Maintain old-growth forests and their representativeness within the area
-Organize the recruitment of old-growth forests
-Include work done in the restoration plan
A restoration plan is used to plan logging within the area, so as to achieve the target level of alteration.

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Assign a maximum target value for regenerating forests and a minimum target value for old-growth forests in every territorial analysis unit (UTA).	Ecosystem management responsible	For each Annual Allowable Cut calculation
2	Give the targets to the Chief Forester so that they can be included in the allowable cut calculation.	Forest manager	For each Annual Allowable Cut calculation
3	Prepare and implement an age structure restoration plan.	Ecosystem management responsible	When preparing tactical plans (PAFIT)

Indicator number:	1.09.1.A	Indicator type:	Performance indicator

Indicator: Percentage of the territory where the forest age structure has a low or moderate degree of alteration compared to historical natural forest.

Scale: Management unit

Indicator clarifications: Percentage of the area in which the forest age structure has a low to moderate degree of alteration compared to the reference status of the natural forest (calculated from the territorial analysis units, UTA).
Some management units have been combined with others because of their small size. In this case the territorial analysis unites are divided among several management units.

Useful definitions: Degree of alteration: in ecosystem-based management, the intensity of the changes observed in the current forest compared to the changes in the natural forest. The degree of alteration may be low, moderate or high. The purpose of estimating the degree of alteration of a forest is to decide whether the situation of a territorial unit is problematic from an ecological standpoint. In the case of forest age structure, the degree of alteration is assessed in comparison to the current abundance of the old-growth and regenerating layers.
Regeneration stage: development stage of a stand under 15 or 20 years of age, depending on the bioclimatic domain. A large number of regeneration stage stands in an area is an indicator of a recent disturbance. In natural conditions, the number of such stands is determined by natural disturbances such as fire, insect infestations and severe windfall. In the managed forest, the number of total cuts (e.g. cutting with protection of regeneration and soils) is a key element in the number of stands at this development stage. From the standpoint of biological diversity, the regeneration stage is usually associated with pioneer species.
Old-growth stage: development stage of a stand over 100 years of age in the spruce domain. A stand reaches the old-growth stage when it begins to acquire certain characteristics, such as a varied vertical structure, the presence of large living trees and large dead trees at various stages of decomposition. It is presumed that a stand will begin to show these characteristics some time after a serious disturbance.
Age structure: relative percentage of forest stands in different age classes, measured over a fairly large area (hundreds or thousands of square kilometres).

Frequency: Five-yearly

Breakdown by: Territorial analysis unit (UTA)

Target: 100% of the UTA

Deviation: None

Target and results for each MU

MU 086-52 Target 100% of the UTA Deviation 0 %

Reference period	Value	Evaluation
Initial state	56,0 %	Red
PAFIT 2018	58,0 %	Red

Information on target:

Timeframe: Depending on the age structure in the territorial analysis units (UTAs), some UTAs may require more time to achieve the target.

Documentation: Reference Status Register
http://www.mern.gouv.qc.ca/publications/forets/amenagement/registre-etats-reference.pdf
Notebook on age structure issues: https://mffp.gouv.qc.ca/wp-content/uploads/Cahier_2-1_structure_age.pdf

Indicator monitoring program:

Verification of age structure data: as and when the allowable cuts are calculated. Preparation of an age structure profile and calculation of the indicator: when the tactical plan is prepared.

Issues and Solutions Sheet prepared by : Dave Levasseur

Approved by : Isabelle Fortin Date : 2019-08-27

Objective number : 2.01.1

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

Management unit(s) : 086-52

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

Chosen strategy and expected effects

1 . Scarification

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

2 . Reforestation (planting or fill planting)

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

3 . Cutting with protection of high regeneration and soils

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

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Site research for adapted forest treatments directed towards ecological types RE12, RE20, RE21, RE22.	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.	Issues and solutions sheets monitoring responsible	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.	Issues and solutions sheets monitoring responsible	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 086-52	Target 60%	Deviation	0 %
Reference period	Value		Evaluation
	0,0 %		Red

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 : Dave Levasseur

Approved by : Isabelle Fortin Date : 2019-10-01

Objective number : 2.01.2

Name of objective : Maintaining the productivity of forest ecosystems susceptible to paludification

Management unit(s) : 086-52

Criteria :	Ecosystem condition and productivity
Issue (value) :	Forest productivity and sustainability
Issue clarification :	
Objective :	Ensure the productivity of forest stands susceptible to paludification. The allowable cut calculations performed by the office of the Chief Forester take into account the impacts of paludification and adjustments to the productivity of these forest layers are made depending on the sylvicultural strategies that are applied.
Connection with other objectives :	This objective is connected with the objective of maintaining woodland caribou habitats (1.07.2). Caribou use these areas of wetter forests.

Chosen strategy and expected effects

1 . Scarification and reforestation (paludification)

Scarification followed by reforestation on paludified sites or sites that are susceptible to paludification. Scarification must be severe enough to destroy the sphagnum and mix the organic matter into the soil.
Species used for reforestation may include black spruce only, or black spruce mixed with tamarack. When trembling aspen is present, it should, if possible, be maintained outside the areas under management, especially for caribou habitat.
Scarification should help reduce the thickness of the organic layer and hence counter the phenomenon of paludification by supporting the site's productivity.
Reforestation with a combination of black spruce and tamarack may help aerate the soil and therefore influence site productivity processes.
Maintenance of the hardwood component increases decomposition rates and nutrient availability, therefore promoting better stand productivity.

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.	Forest manager	All year long
2	Prescribe site preparation in link with the regional paludification issue management strategy.	Forest manager	All year long
3	When planning silvicultural work, provide for a land preparation experimental trial followed by reforestation with a combination of black spruce and tamarack.	Forest manager	All year long
4	Annual review of harvested stands paludified or prone to paludification.	Issues and solutions sheets monitoring responsible	Following annual report deposit

5	Annual review of harvested stands paludified or prone to paludification that have undergone an adapted forest treatment.	Issues and solutions sheets monitoring responsible	Following annual report deposit

Indicator number: 2.01.2.A Indicator type: Performance indicator

Indicator: Ratio of harvested paludified stands (or stands susceptible to paludification) that have undergone forestry operations adapted to paludification in accordance with the regional strategy.

Scale: Management unit

Indicator clarifications:

Useful definitions: Paludification: natural process involving the accumulation of organic matter leading to the formation of peat bogs.

Frequency: Five-yearly

Breakdown by: Year

Target 70 %

Deviation: None

Target and results for each MU

MU 086-52	Target 70 %	Deviation	0 %
Reference period		Value	Evaluation
		72,0 %	Yellow

Information on target:

Timeframe:

Documentation: "Stratégie régionale d'aménagement pour la problématique de paludification"available on request as an appendix to the tactical plan.
Chief Forester's information sheet on paludification: http://forestierenchef.gouv.qc.ca/wpcontent/uploads/2013/01/193-199_MDPF_Paludification.pdf

Indicator monitoring program:

Issues and Solutions Sheet prepared by : Dave Levasseur

Approved by : Isabelle Fortin Date : 2019-10-01

Objective number : 3.02.2

Name of objective : Protecting fish habitat, especially spawning grounds

Management unit(s) : 086-52

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 . 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.

2 . 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.

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 086-52 Target 100% of the spawning sites reported Deviation 0 %

Information on target:

Timeframe:

Documentation:

Indicator monitoring program:

Issues and Solutions Sheet prepared by : Sophie Dallaire

Approved by : Marco Trudel Date : 2019-08-27

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