TACTICAL INTEGRATED FOREST DEVELOPMENT PLAN 2018–2023

applicable to forest management units 071-51, 071-52, 072-51, 073-51, 073-52 and 074-51 - Outaouais Region

Québec

Produced by

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This publication is designed for two-sided printing. It can only be found at:
https://mffp.gouv.qc.ca/forets/amenagement/planification-forestiere/outaouais.jsp

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List of Acronyms

$m	Millions of dollars
ABBD	American beech bark disease
ACC	Allowable cut calculation
AITP	Areas of increased timber production
AMB	American beech
AML	American larch
ANPL	Annual plan
ARB	Eastern white cedar
BA	Basal area
BAF	Balsam fir
BCU	Block cutting
BDSO	Databank of Official Statistics on Québec
BFEC	Bureau du forestier en chef (Chief Forester's Office)
BLA	Black ash
BLS	Black spruce
BMMB	Bureau de mise en marché des bois (timber marketing board)
CEAF	Forest Management Certification Program
CIMOTFF	Comité sur l'impact des modalités opérationnelles des traitements en forêt feuillue (Committee on the impact of deciduous forest treatment operating procedures)
CLE	Cleaning
C_p	Costs in perpetuity
CPHRS	Cutting with protection of high regeneration and soils
CPSMT	Cutting with protection of small merchantable trees
CREO	Conférence régionale des élus de l'Outaouais
CRRNTO	Commission régionale sur les ressources naturelles et le territoire de l'Outaouais
CSA	Canadian Standards Association
CT	Commercial thinning
DBH	Diameter at breast height
DGFO	Direction de la gestion des forêts de l'Outaouais
DGR	Direction générale régionale
DGSSO	Direction générale du secteur sud-ouest
EFE	Exceptional forest ecosystems
FBMU	Furbearer Management Unit
FIL	Fill planting
FIPAM	Forest Investment Profitability Assessment Model

FMU	Forest Management Unit[1]
FOZ	Forest operations zone
FSC	Forest Stewardship Council
FSJA	Group of species (balsam fir, spruce, jack pine, and American larch)
ha	Hectare
HA/YR	Hectare per year
HEM	Eastern hemlock
HLWP	Harvesting license for timber used in a wood processing plant
HYP	Hybrid poplar
IFMP	Integrated Forest Management Plan
ISCPC	Irregular shelterwood cutting with permanent cover
ISCSG	Irregular shelterwood cutting with slow regeneration
ISSG	Invasive Species Specialist Group
JAP	Jack pine
km	Kilometer
LILRMP	Local Integrated Land and Resource Management Panel
m^3	Cubic meter
MDDELCC	Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques
MERN	Ministère de l'Énergie et des Ressources naturelles
MFFP	Ministère des Forêts, de la Faune et des Parcs
Mha	Million hectares
MRNF	Ministère des Ressources naturelles et de la Faune
MT	Management team
NAICS	North American Industry Classification System
NPV	Net present value
NPV_p	Net present value in perpetuity
OIFMP	Operational Integrated Forest Management Plan
ONH	Other noble hardwoods
PAB	Paper birch
PC	Partial cutting
PCT	Precommercial thinning
PDO	Protection and Development Objective Implementation Goal
PL	Planting
PLUP	Public Land Use Plan
POP	Group of poplar species

[1] The *Sustainable Forest Development Act* refers to these forest management units as "Development Units"

PRDIRT	Plan régional de développement intégré des ressources naturelles et du territoire public (Regional plan for integrated land and natural resource development)
PRU	Pruning
PSC	Patch selection cutting
QFIC	Québec Forest Industry Council
RADF	*Règlement sur l'aménagement durable des forêts du domaine de l'État* (Regulation respecting sustainable forest development in the domain of the State)
RC	Regeneration cutting
RCM	Regional county municipality
RCPRS	Regeneration cutting with protection of regeneration and soils
REF	Reforestation
REL	Mechanical release
REM	Red maple
REO	Red oak
REP	Red pine
RMP	Regional Monitoring Plan
RNI	*Règlement sur les normes d'intervention dans les forêts du domaine de l'État* (Regulation respecting standards of forest management in the domain of the State)
RSC	Regular shelterwood cutting
SADF	Sustainable Forest Development Strategy
SC	Selection cutting
SCA	Scarification
SEC	Seed cutting
SEE	Seeding
SEPAQ	Société des établissements de plein air du Québec
SFDA	*Sustainable Forest Development Act*
SFI	Sustainable Forestry Initiative
SFMP	Sustainable Forest Management Program
SOR	Secteur des opérations régionales
SPB	Spruce budworm
SUM	Sugar maple
SWA	Structured wildlife areas
TIFMP	Tactical Integrated Forest Management Plan
TRGIRTO	Table régionale de gestion intégrée des ressources et du territoie de l'Outaouais (Outaouais regional integrated land and resource management panel)
TRU	Territorial reference unit
TSFMA	Timber Supply and Forest Management Agreement
TUA	Territorial unit of analysis
TVSL	Threatened or vulnerable species or species likely to be so designated

AGQ	Auditor General of Québec
VOITs	Values, objectives, indicators, and targets
VRH	Variable retention harvesting
WDY	White-tailed deer yard
WHP	White pine
WHS	White spruce
WOI	Wetlands of interest
WSI	Wildlife sites of interest
YEB	Yellow birch
ZEC	Controlled Harvesting Zone
ZECO	Association des zones d'exploitation contrôlée de l'Outaouais (Association of Outaouais controlled harvesting zones)

Glossary[2]

Aging patch	Area of a forest where most stands are left to age until they are mature or overmature, over a longer period than planned for harvesting.
Basal area	Surface area, measured at breast height, of a trunk's cross section or total surface area of the cross sections of all tree trunks in a stand.
Biological legacy	A forest characteristic inherited from a previous forest ecosystem that was altered following a natural or anthropogenic disturbance.
Cleaning	Cultivation process that involves harvesting competing plants to make way for desired species in a stand at the sapling stage.
Climate change	Noticeable change in climate variables that persists over time and can be attributed to natural variability or human activity.
Compartment of Spatial Organization	Subsection of a spruce-moss stand management unit, in which the forest's age structure is relatively uniform, created to manage the distribution of aggregated cutbacks and the presence of large forest tracts.
Diameter at breast height	The diameter of a tree measured at 1.3 m above ground level.
Ecological type	Unit of ecological classification describing a local tract of land using a combination of the potential vegetation and the type of physical environment.
Even-aged	Used to describe a stand or forest with trees in the same age group.
Forest Management Unit	Unit of land used as the basis for calculating the allowable cut and planning forestry operations.
Forest strip	Strip of forest left unharvested, adjacent to certain locations or communities.
Irregular structure	Stand structure made up of more than one level of crowns corresponding to trees of different sizes and age groups.
"M" in the MSCR classification	"M" (moribund) in the MSCR classification is used for trees that will die in less than 20 years.
Marking	Process of selecting then marking trees to be cut down or left to grow during a scheduled harvest.
MSCR classification	Québec classification system used to assess the vigor and quality of trees in a stand
Regular structure	Stand structure made up of a single level of crowns corresponding to trees of different sizes and age groups.
Release	Cultivation process that involves harvesting competing plants to allow desired species to regenerate in a stand at the seedling stage.
Riparian environment	Buffer zone between an aquatic ecosystem and a terrestrial ecosystem.
"S" in the MSCR classification	"S" (surviving) in the MSCR classification is used for distressed trees that are likely to decay but will survive the next 20 years.
Sapling	Young tree, bigger than a seedling but smaller than a pole, with a trunk that is still relatively flexible.
Sapling stand	Stand with regular structure, mostly made up of saplings.

[2] Forestry glossary available at http://glossaire-forestier.mffp.gouv.qc.ca/

Silvicultural scenario	Planned sequence of silvicultural regimes to be carried out in a stand or group of stands over a given period in accordance with management objectives.
Silviculture	Science used to control the establishment, growth, composition, health, and quality of forest stands as well as the productivity of sites and the art of putting this science into practice to meet specific objectives.
Silviculture prescription	Formal recommendation for silvicultural regimes to be carried out in a given forest stand.
Territorial reference unit	Forest Management Unit or other section of forest land in the domain of the State or a subsection of such land, all in one piece, on which forestry resource management is carried out.
Territorial unit of analysis	Subsection of a spruce-moss stand development unit, used as the basis for establishing the forest's age structure targets.
Uneven-aged	Used to describe a stand or forest with trees in one or more age groups.
Wetland	An area that is flooded or saturated with water for long enough to affect the nature of the ground and the composition of the vegetation.
Windfall	A tree or trees uprooted or snapped at the base of the trunk due to severe weather or age. 2. An area with a large number of trees that have been uprooted or have snapped at the base of the trunk due to severe weather or age.
Wood substance	Generic term used for wood as an economically accessible substance produced in a forest.

Introduction

This tactical integrated forest management plan (TIFMP) includes the most important aspects of forest management guidelines. It will help managers choose the right forestry measures to implement for the 2018–2023 period for all forest management units (FMUs) in the Outaouais region. This document will be used for the TIFMP presentation to local integrated land and resource management panels (LILRMP) and during public consultations. It will also satisfy certain forestry certification requirements. The TIFMP includes general sections covering legal aspects, profile of the region, management challenges, management strategy, and forestry monitoring. However, the section on management levels is tailored to each forest management unit.

This document is concise and accessible to a wide audience. Some topics are covered only briefly. The references at the end will help readers learn more about specific concepts they may be interested in.

PART 1: GENERAL INFORMATION

1. Legal background

1.1 Provisions for forest management activities

The Ministère des Forêts, de la Faune et des Parcs (MFFP) is responsible for the use and development of land, forestry and wildlife resources. More specifically, MFFP manages all aspects of the sustainable management of forests in the domain of the State while supporting the development of private forests and the forest products industry. It creates and implements research and development programs for acquiring and sharing knowledge on topics associated with sound forest management and forest product processing. MFFP's responsibilities in relation to Québec's forests include drawing up forest inventories, producing seeds and plants for reforestation as well as protecting forests against fire, disease, and insects.

Various legal and administrative provisions help MFFP ensure forests are managed sustainably. The most important piece of legislation is the *Sustainable Forest Development Act* (SFDA)[3], enacted in April 2013. Many of the Act's provisions apply directly to forest planning and forest management activities.

Sustainable Forest Development Act

Provisions for forest management activities

Section 1

According to Section 1 of SFDA, the forest regime in place is designed to

Ecosystem-based management
Integrated regionalized management
Participative management

1. implement sustainable forest management, in particular through ecosystem-based management;
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 the domain of the State;

[3] Gouvernement du Québec (2017a)

Free market	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 management of private forests; and 7. govern forest protection activities.
Supply guarantees	Supply guarantees (SG) and permits to harvest timber to supply a wood processing plant (PHTS) are the main forest rights granted in forest management units, securing access to wood substances and maintaining a stable supply. MFFP makes wood substances more widely accessible by selling wood from public forests at auction. In this way, the government adapts its management methods to the realities and needs of local and regional communities.
	Section 54
Management plans	"The Minister draws up a tactical plan and an operational plan for integrated forest development for each development unit, in collaboration with the local integrated land and resource management panel set up for the unit pursuant to 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.
TIFMP	The tactical plan contains, among other things, the allowable cuts assigned to the unit, the sustainable forest management objectives, the forest management strategies adopted to ensure that allowable cuts are respected and objectives are achieved, and the location of the main infrastructure and the areas of increased timber production. This plan covers a five-year period.
OIFMP	The operational plan basically sets out the forest operations zones in which timber harvesting or other forest management 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[4] for the preparation of plans, and guides that the Minister follows to prepare sylvicultural prescriptions."

[4] MFFP (2016g).

Section 55

LILRMP

"The local integrated land and resource management panel is set up in order to ensure that the interests and concerns of the persons and bodies affected by planned forest management objectives are taken into account, to define local sustainable forest management objectives and to agree on measures to harmonize the use of resources.

Operation

The composition and operation of a panel, 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 panel:

Dispute resolution

Participants

1. Native communities, represented by their band council;
2. Regional county municipalities and, if applicable, the metropolitan community;
3. Holders of a timber supply guarantee;
4. Persons or bodies that manage controlled zones;
5. Persons or bodies authorized to organize activities, provide services or carry on a business in a wildlife sanctuary;
6. Holders of an outfitter's license;
7. Holders of a sugar bush management permit for maple syrup production;
8. Lessees of land for agricultural purposes;
9. Holders of trapping licenses who hold a lease of exclusive trapping rights; and
10. Regional environmental councils."

Section 57

Public consultation

"Integrated forest development plans must be the object of a public consultation held by the body responsible for the composition and operation of the local integrated land and resource management panel 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.

Consultation report

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."

	Section 58
Ecosystem-based management	"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."
	Section 40
Departure from forest development standards	"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 for Aboriginal communities

Consideration of the interests, values, and needs of Aboriginal communities living on forest land is an integral part of sustainable forest management. Such communities are invited to participate in the work of the local integrated land and resource management panel. There is a separate consultation for Aboriginal communities affected by forest planning, allowing these communities to share their concerns about the potential impact of planned activities on their domestic, ritual, or social activities. Based on the outcome of these consultations, the concerns, values, and needs of Aboriginal communities are taken into consideration in sustainable forest management.

As stated in the section on the legal background, the minister may, under Section 40 of the SFDA, impose different forest development standards, to reconcile forest management activities with the activities pursued by an Aboriginal community.

1.3 Environmental management system

Secteur des opérations régionales (SOR) has drawn up and adopted an environmental and forest policy. The policy reaffirms SOR's commitment to:

- Comply with or exceed the legal requirements
- Continuously improve its performance in relation to forests and the environment
- Prevent, reduce, and fight against pollution
- Act as an informed owner

To implement its Environmental and Forest Policy, SOR has introduced an environmental management system that complies with sustainable forest management criteria.

The system applies to SFDA activities relating to forest planning, management of contracts and agreements, as well as monitoring and control of associated forestry operations.

Companies that carry out forest management activities on behalf of MFFP also have an impact on the environment. For this reason, they must also hold a certificate recognized by the minister (ISO 14001 or the Forest Management Certification Program [CEAF]) to demonstrate that they limit the environmental impact of their own activities. Accountability on the part of forest management companies helps MFFP implement and monitor forest management activities based on sound environmental management. Accountability also helps harmonize standards, facilitate communication between MFFP and its partners, and encourage the maintenance of forest certification.

1.4 Certification

Forestry certification is an external verification process designed to recognize forest land managed and developed by organizations that apply sustainable management principles. These principles are defined by different forest certification systems. The resulting standards take into account global forest issues as well as the values and, in some cases, the specific characteristics of Canada's major ecological regions.

In Québec, there are three forest certification systems, managed by the following certification bodies:

1. The Canadian Standards Association (CSA)[5] for sustainable forest management
2. Forest Stewardship Council (FSC)[6]
3. Sustainable Forestry Initiative (SFI)[7]

Certification is primarily a means of addressing the requirements of customers and markets. A certificate from a neutral, internationally recognized body provides an assurance that the practices used are of good quality, and the principles of sustainable development have been upheld.

In Québec's public forests, responsibility for obtaining certification falls to forestry companies. Within the scope of its remit, MFFP works with these companies to help them obtain or maintain certification.

Depending on their market, companies that decide to pursue certification choose the system that best meets their needs. Compliance with minimal certification requirements is required of all stakeholders on the territory covered by the certificate.

MFFP does not favor any one certification system over the others. However, it believes that certification provides additional recognition of the quality of the management practices implemented under Québec's forest regime.

In Outaouais, the area covered by FMUs 071-51, 071-52, 073-51, 073-52, and 074-51 comes under SFI certification. For FMU 072-51, the scope of the certificate applies only to forest activities conducted by a certificate holder.

2. A history of forest management

Over the last 40 years, many initiatives have been put forward to take stock of Québec's forest regime, recommend measures for change, and adapt the policies and legislative framework surrounding the management of forests in the domain of the State. These adaptations have resulted in major advances to foster public engagement, the long-term survival of forest ecosystems, and more effective government control.

[5] Association canadienne de normalisation (2010).
[6] Forest Stewardship Council Canada (2010).
[7] Sustainable Forestry Initiative (2015).

A history of forest management

Key stages

Québec's forest policy in 1972

Abolition of forest concessions

The policy's main objective was to dissociate the wood allocation method from the forest management method. The proposed change was based on the observation that increased demand for wood and wooded areas for other uses would require greater government involvement, including stricter and more direct control of the forest. Management of public forests could not be left to wood users, who need to produce short-term profit, while forest management requires action over the long-term. The government was acting merely as a custodian and instead wanted to actively manage forest resources for the well-being of the community. It was time to abolish the forest concession regime.

Forest management from 1986 to 2013

TSFMA

In 1986 the government enacted the *Forest Act* and reached a significant turning point in forest management by abolishing forest concessions and instead introducing a new wood allocation method, the Timber Supply and Forest Management Agreement (TSFMA). The Act introduced new rules for forests in the domain of the State:

Sustained yield

1. Obligation to comply with the annual allowable cut at all times
2. Obligation to restore production after sites are harvested
3. Obligation to protect forest environments and preserve their resources, allowing for multipurpose use of forest land
4. Obligation to pay timber cutting fees established according to the commercial value of the wood harvested

Natural dynamics

Forest Protection Strategy in 1994

The Forest Protection Strategy includes all commitments made by the Québec government in 1994 to create new forest management approaches. These management approaches were based on five main principles:

Natural regeneration

1. Maintaining the biological diversity of the environment so forests are more resistant, increasing the number of ways in which forest land is used, and improving forest productivity
2. Protecting the natural dynamics of stands in order to limit competing vegetation and maintain the overall productivity of each site
3. Taking the characteristics of each site into account in planning forest operations
4. Emphasizing natural regeneration and only planting adapted species when necessary
5. Making forests and forest stands less vulnerable to insects and diseases by planning preventive silvicultural management activities that maintain the vitality of trees.

Abolition of herbicides

Once the Forest Protection Strategy came into force, insecticides and herbicides were no longer used to fight insects and pests.

Review of the forest regime in 2000

In 1996, Québec undertook a review of the forest regime. After public consultations, a bill amending the *Forest Act* was adopted in 2001. The forest regime review introduced the following changes, among others:

PDO

Public engagement

- Forest resource protection and development objectives (PDOs)[8]
- Greater stakeholder involvement in preparing forest management plans
- The introduction of a northern commercial logging limit
- Recognition of exceptional forest ecosystems
- Contract reviews according to the forest, environmental, and industrial performance of companies

Forest management since 2013

Forest planning

The *Sustainable Forest Development Act* came into force on April 1, 2013. MFFP is responsible for the sustainable development and management of forests in the domain of the State, which means it is responsible for forest planning, forest operations monitoring and control, allocation of forest rights, as well as timber scaling.

Auctions

MFFP sells a portion of the timber from forests in the domain of the State at auction. In addition, MFFP may delegate the management of land and certain resources to an Aboriginal community, a municipality, a legal entity, or an organization.

Ecosystem-based management

This management method supports sustainable forest management, particularly through ecosystem-based management, in order to ensure the long-term survival of forests. It promotes integrated management of land and resources and has specific measures for Aboriginal communities.

SADF

The Sustainable Forest Development Strategy (SADF), made public on December 17, 2015, has replaced the Forest Protection Strategy.

RADF

The *Règlement sur l'aménagement durable des forêts du domaine de l'État* (Regulation respecting sustainable forest development in the domain of the State, RADF)[9] will come into effect on April 1, 2018, and will replace the *Regulation respecting standards of forest management in the domain of the State* (RNI).[10]

[8] MRNFP (2005).
[9] Gouvernement du Québec (2017b).
[10] Gouvernement du Québec (2017c).

3. Provincial guidelines

3.1 Sustainable Forest Development Strategy (SADF)

SADF[11] sets out the vision and specifies the sustainable forest management guidelines and objectives, particularly in terms of ecosystem-based management. It also defines the mechanisms and means required for its implementation, monitoring, and evaluation (Section 12, SFDA). SADF includes six objectives:

1. Forest management that takes the interests, values, and needs of the Québec population and Aboriginal nations into account
2. Forest management practices that ensure ecosystem sustainability
3. A forest environment that is productive and creates wealth at different levels
4. A diversified, competitive, and innovative wood products and forestry industry
5. Forests and a forest industry that adapt to and help fight climate change
6. Sustainable, structured, and transparent forest management

The vision, challenges, and guidelines cover a twenty-year period, while the objectives and actions are set out for five years.

The tactical integrated forest management plan is a key resource for achieving a number of SADF objectives. On the one hand, the plan has been drawn up using a participative, structured, and transparent management approach, thanks to the cooperation of the local integrated land and resource management panel. On the other, the objectives, indicators and targets relating to the ecological issues that are in line with the implementation of ecosystemic development.

4. Regional planning

4.1 Tactical Integrated Forest Management Plan

The Tactical Integrated Forest Management Plan is carried out over five years. The plan sets out the sustainable management objectives for forests as well as the forest management strategy selected to reach these objectives and ensure compliance with allowable cuts.

[11] MFFP (2015f).

MFFP's planner will be required to put forward management solutions that address the social, economic, and environmental challenges identified by the LILRMP for the area. The solutions selected will, among other things, make it possible to choose the best silvicultural scenarios.

4.2 Operational Integrated Forest Management Plan

The Operational Integrated Forest Management Plan basically sets out the forest operations zones in which timber harvesting or other forest management activities (non-commercial silvicultural work and roads) are planned under the tactical plan. The OIFMP is an aggressive plan that is continuously updated to include new prescribed and standardized operations zones. The planner collaborates with the timber marketing board known as the Bureau de mise en marché des bois (BMMB) to identify the sectors where wood will be sold on the open market.

4.3 Annual plan

For harvesting activities, holders of cutting rights, in cooperation with MFFP, select from the OIFMP the operations zones that could be targeted over the course of a year. This annual plan (ANPL) must make it possible to achieve the expected volume and comply with the forest management strategy in the TIFMP. The ANPL also includes infrastructures and criteria relating to compliance with our commitments.

4.4 Public Land Use Plan

Public Land Use Plans (PLUPs)[12] identify and set out government guidelines for the use and protection of public land. The guidelines are drawn up by various ministries and agencies working together, under the responsibility of Ministère de l'Énergie et des Ressources naturelles (MERN).

More specifically, MFFP must implement the government guidelines in the PLUP when managing public land. To this end, the process for carrying out the integrated forest management plans (IFMPs) will involve some dovetailing. The summary of the PLUP can be found in Appendix F.

[12] MERN (2012).

5. Participative management

5.1 Regional Integrated Land and Resource Management Panel

In December 2015 the Outaouais and Ville de Gatineau regional county municipalities (RCMs) signed an agreement with the Minister of Forests, Wildlife and Parks under which a portion of the Sustainable Forest Management Program (SFMP) would be delegated to them. The program supports the work of the LILRMPs and the implementation of specific projects. The delegated RCMs appointed the Pontiac RCM to be responsible for administering the agreement. A single panel, was set up covering the six FMUs for which the MFFP Direction Générale Régionale (DGR) MFFP in Outaouais is responsible. This panel then became Table régionale de gestion intégrée des ressources et du territoire de l'Outaouais (TRGIRTO), or the Outaouais regional integrated land and resource management panel).

The task of TRGIRTO is to define the forest management challenges and agree to a set of objectives for the protection and development of each FMU's resources and land. The panel must issue recommendations to assist MFFP's Direction de la gestion des forêts de l'Outaouais (DGFO) in drawing up TIFMPs and OIFMPs.

These objectives must comply with the guidelines, objectives, and targets defined in the Regional Plan for Integrated Land and Natural Resource Development (PRDIRT)[13].

TRGIRTO: Made up of six sector-specific groups that include the main partners representing various sectors and groups with an interest in public land:

- Wood Group
- Wildlife Group
- Group for Other Users With Rights
- Nature Group
- Land Group
- First Nations Group

For the Land Group, each RCM seeking to participate in the work of TRGIRTO can only delegate one representative.

For the First Nations Group, each RCM seeking to participate in the work of TRGIRTO can only delegate one representative.

See Appendix B for the composition of TRGIRTO.

[13] CRRNTO (2011).

Meetings	TRGIRTO meets five times a year. The meetings are public. Only the representatives of the sector-specific groups, or their replacements, can sit on the discussion panel. Any other attendees at the meetings will be seated at tables around the outside of the room and may only participate as observers.

5.2 Public consultation

Under Section 57 of SFDA, integrated forest management plans are subject to public consultation. The conduct of the 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.[14]

5.3 Aboriginal consultation

In accordance with Section 7 of SFDA, the minister must consult Aboriginal communities specifically to ensure that sustainable forest development and forest management take into account, and accommodate if necessary, their interests, values, and needs.

5.4 Changes to IFMPs and consultation

According to Section 59 of SFDA, changes and updates to IFMPs are also subject to public consultation. Public consultation only applies to additions or changes. However, changes or updates to operational plans for integrated forest management plans are only subject to public consultation if they:

- Add a new forest operations zone (FOZ) or a new infrastructure
- Substantially change a forest operations zone, an infrastructure, or a forest management standard already identified in the plan

Moreover, public consultation is not required for special development plans or changes to them if the minister thinks that they must be implemented urgently, particularly if the plan is considered necessary in order to avoid a deterioration or loss of timber (Section 61, SFDA).

[14] MFFP (2016f).

PART 2: DESCRIPTION OF THE REGION COVERED BY THE TIFMP

6. Description and history of the region and its resources and use

6.1 Location of the forest management units

The Outaouais administrative region is in the southwest of the province of Québec and covers more than 3.4 million hectares. It includes the RCMs of Pontiac, Papineau, Collines-de-l'Outaouais, and Vallée-de-la-Gatineau as well as the city of Gatineau.

There are six forest management units on public land within its boundaries, identified as 071-51, 071-52, 072-51, 073-51, 073-52, and 074-51. The last two extend into a portion of the Vallée-de-l'Or RCM in the administrative region of Abitibi-Témiscamingue.

The following table shows the proportions of each FMU in each RCM as well as the closest main urban areas.

Table 1. RCMs and main urban areas and percentage of surface area occupied by Outaouais region forest management units

RCM	Biggest Municipalities (over 1,000 Residents) [15] and Aboriginal Reserves	Percentage Occupied by FMUs	
		FMU	(%)
Les Collines de l'Outaouais	Val-des-Monts, Cantley, La Pêche, Chelsea, Pontiac, L'Ange-Gardien	072-51	5%
		071-51	9%
Papineau	Saint-André-Avellin, Thurso, Papineauville, Ripon, Plaisance	072-51	82%
Pontiac	Mansfield-et-Pontefract, Shawville, Fort-Coulonge, L'Isle-aux-Allumettes, Clarendon, Otter Lake, Bristol	071-51	91%
		071-52	100%
		073-51	12%
		073-52	65%
Vallée-de-la-Gatineau	Maniwaki, Gracefield, Déléage, Messines, Grand-Remous Aboriginal reserves: Kitigan Zibi, Lac-Rapide	072-51	12%
		FMU 073-51	88%
		FMU 073-52	23%
		FMU 074-51	60%

[15] MAMOT (2017).

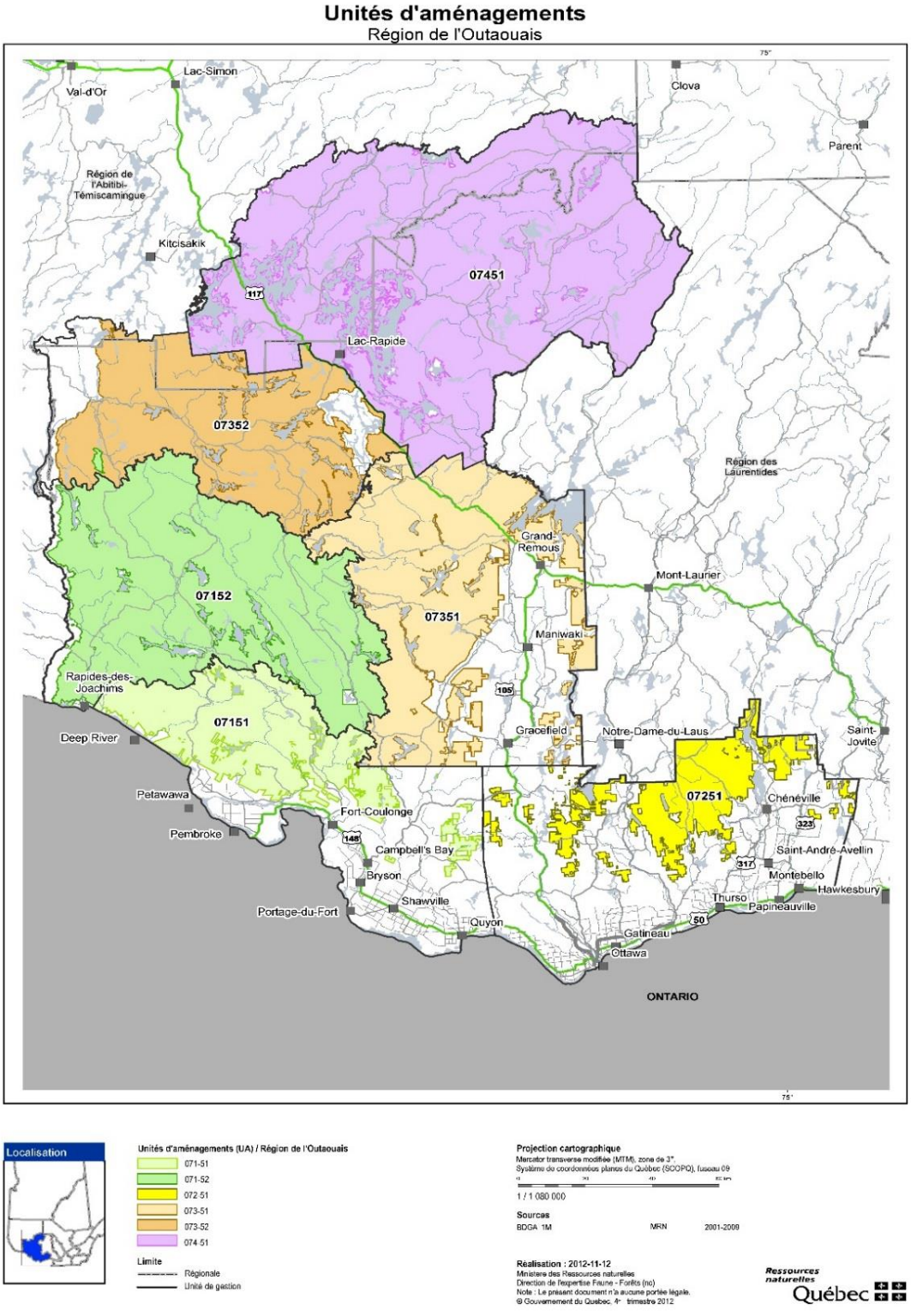


Figure 1. Location of Outaouais forest management units

The management teams (MTs) responsible for regional management are as follows:

1. In Mansfield, the Coulonge Management Team manages FMU 071-51 and 071-52
2. In Gatineau, the Basse-Lièvre Management Team manages FMU 072-51
3. In Maniwaki, the Haute-Gatineau and Cabonga Management Team manages FMU 073-51, 073-52, and 074-51

Up-to-date electronic files on forests, lakes, and watercourses as well as on relief, deposits, and drainage can be obtained from the the Québec government's Géoboutique.[16] Hard copies can also be obtained from various outlets.

6.2 Area where forest management activities are carried out

6.2.1 Reference areas

The reference area for each FMU covers all forest land where forest management activities may be carried out as well as forest land used for other purposes. All forest land within the boundaries of the reference area is taken into account in analyzing the issues and defining the management objectives. Reporting for a number of issues is also conducted on this basis.

6.2.2 Areas excluded from forest management

Consideration of certain conservation issues and issues relating to flora and fauna or the deployment of the primary road network means excluding some forest from the harvest or applying special operations.

Règlement sur l'aménagement durable des forêts du domaine de l'État (Regulation respecting sustainable forest development[17] in the domain of the State), which will come into effect on April 1, 2018, and will replace the *Regulation respecting standards of forest management in the domain of the State*, includes concrete measures aimed at:

[16]Available at https://mffp.gouv.qc.ca/forets/inventaire/couches-cartes-papier.jsp.

[17]For more information on *Règlement sur l'aménagement durable des forêts du domaine de l'État*, go to https://mffp.gouv.qc.ca/forets/amenagement/amenagement-reglement.jsp.

- Protecting resources in forests, bodies of water, and wetlands
- Preserving or restoring forest cover
- Making forest management more compatible with the other activities carried out in forests in the domain of the State
- Contributing to sustainable forest management

The box below sets out the main areas excluded from forest management.

Areas excluded from forest management

Protected areas and areas of interest	These areas are geographically defined expanses of land or water established under a legal and administrative framework designed specifically to ensure the protection and maintenance of biological diversity and of related natural and cultural resources. In all, protected areas and areas of interest cover 10.7% of the Outaouais region. Biological refuges and exceptional forest ecosystems (EFE) are two such areas.
Biological refuges	Small areas of forest are permanently excluded from forest management in order to preserve the biodiversity of old-growth forests. Refuges have been defined in accordance with a target of 2% in each forest management unit. The total surface area available for forest management has therefore been reduced by 48,230 hectares, divided into 429 biological refuges. Of these, 375 are in the protected area network.
Exceptional forest ecosystems (EFE)	These ecosystems are particularly important for preserving biological diversity. Under the SFDA, certain forest ecosystems can be classified as exceptional, which provides legal protection against any activity that may alter them. EFEs are divided into three specific categories: old-growth forests, rare forests, and forest refuges for threatened or vulnerable species. The FMUs in the region include 26 EFEs protected by order and 6 planned EFEs, for a total of 3,758 hectares.
Islands	Islands have been excluded from land available for wood harvesting since 1990. The region's islands cover a surface area of almost 40,000 ha, 96% of which is in FMU 074-51. Large islands of more than 250 ha are all located in that same FMU, and most of them are in reservoirs including the Cabonga, Dozois, and Baskatong. Access to these islands for logging requires the construction of ice bridges, and this type of expertise is underdeveloped in our climate. In addition, the water levels of the reservoirs are managed by Hydro-Québec and fluctuate in the winter, making it hard to plan the construction of ice bridges.

These excluded areas also have various biophysical constraints, such as steep gradients (above 40%), very poor drainage (hydric), and unproductive forest land,[18] that make forest development impractical.

Special conditions are in place to protect other sites not covered by the RADF, such as:

[18] Unproductive forest land includes areas where the volume of merchantable timber per hectare is under 30 m^3, such as dry and wet bare land and alder groves.

- Habitats of threatened or vulnerable species or of species likely to be so designated (TVSL), for both flora and fauna
- Planned protected areas whose boundaries have been acknowledged by the the Québec government
- Wildlife sites of interest

Electronic files listing all these sites can be consulted in the management team offices. The files are updated continuously and are taken into account during operational planning and in the field.

6.3 History of the land

6.3.1 History of natural disturbances

Natural disturbances are an integral part of the dynamics of forest ecosystems. They have a direct influence on the biological diversity of forests. The variations among forests within a given area stem from many types of disturbances combined with the effects of climate and physical environments. The occurrence of disturbances has a direct impact on the succession of stands and on the type of forest management to be carried out. Changes in climate affect the nature and intensity of natural disturbances.

History of natural disturbances: Major disturbances in Outaouais	
Fires	Since the end of the last ice age, forest fires have resulted in the development and renewal of pine and oak tracts in the southwest of Outaouais. Since the first network to fight forest fires was put in place in Outaouais in 1894, major efforts have been made to protect forests and regional infrastructure from fire. The most recent major fires were in the 1950s. Today, fires affect only small areas each year.
Spruce budworm (SPB)	This insect is a threat to forests dominated by balsam fir and white spruce. The pine forests in the region are reconstructing following the epidemic that ravaged close to 32 Mha in Quebec during the 1970s. The next epidemic lasted from 1992 to 2011 in the area between Fort-Coulogne, Maniwaki and Buckingham. It peaked in 2006, impacting more than 40,000 ha that year. The spruce budworm epidemic that is currently impacting Témiscamingue is being monitored. The 2017 report shows that some of the observation points present low and moderate levels of deforestation caused by the insect.
American beech bark disease (ABBD)	This disease kills infected trees. Its progression has been steadily on the rise since it was first discovered in 1998. A special recovery plan was implemented in 2014 to save American beech trees that already had the disease or were at risk.

Emerald ash borer	The emerald ash borer has caught the attention of the media in recent years because of the high mortality rate in urban and peri-urban areas. This exotic Asian insect only has a handful of natural enemies in North America. Native ash species (white ash, black ash, and Pennsylvania ash) have never coexisted with the emerald ash borer and so have not developed resistance. Inventories have shown that the emerald ash borer damages and kills most ash trees in an ash stand within one to four years of the start of the infestation, and overall, 99% of ash trees die within six years.[19] The lack of economically viable methods to combat the emerald ash borer in forests, combined with the low proportion of ash trees and the insect's dispersion in Outaouais public forests, severely limits the action that can be taken to eradicate the insect.

Other disturbances

Insects	*Disease*	*Climatic events*
• Hemlock looper • Swaine jack pine sawfly • Forest tent caterpillar • White pine weevil	• White pine blister rust	• Windfall • Freezing rain • Drought

For more information see the MFFP web page on the strategy to protect forests against insects and diseases, at
http://www.mffp.gouv.qc.ca/forets/fimaq/insectes/fimaq-insectes.jsp

6.3.2 History of silvicultural regimes (anthropogenic disturbance)

Logging in Outaouais began with the harvesting of pines and oaks in 1806. The opening of the first sawmill in Gatineau two years later marked the beginning of large-scale logging in hardwood and pine forests, an activity that was encouraged in order to make land suitable for colonization. Here are some key dates in the history of Outaouais forests:

1854	Forests became open to the U.S. market
1925 to 1946	Railroad connecting Thurso and Mont-Laurier was built
1940	Plywood plant in Sainte-Thérèse opened

In Québec, the practice of selection cutting in maple stands started in the early 1980s and gradually replaced diameter-limit cutting in hardwood forests in the domain of the State.[20] By the time the Forest Protection Strategy was adopted in 1994, diameter-limited cutting had been completely replaced.

From 2000 to 2015, regeneration cutting (RC) was carried out on more than 140,000 ha and partial cutting (PC) on more than 175,000 ha.

[17] Natural Resources Canada (2016).
[20] Guillemette et al. (2013).

6.4 Socioeconomic background

6.4.1 Regional background

According to provisional data, the population of Outaouais was 385,600 as of July 1, 2015, i.e., 4.7% of the population of Québec.[21] People live mostly in the southern part of the region, in and around the city of Gatineau.

Service industries account for 84.4% of the region's gross domestic product (GDP)[22], mostly due to proximity to the federal capital. Outside urban and peri-urban areas, the economy is more dependent on natural resources and on public land.

In 2012 the pulp and paper product manufacturing sector of the forest industry generated total revenue of $663 million, $238 million in manufacturing value added, and 1,566 direct jobs.[23]

6.4.2 Description of the forest sector

The economic situation of Québec's forest products industry has been in decline since 2004, both for wood products and for pulp and paper. This can be explained by a drop in demand for printing paper, including newsprint, and the dismal state of the United States construction industry since 2008.[24] The change in the number of wood-processing plants since 2000 in the figure below clearly shows this specific situation.

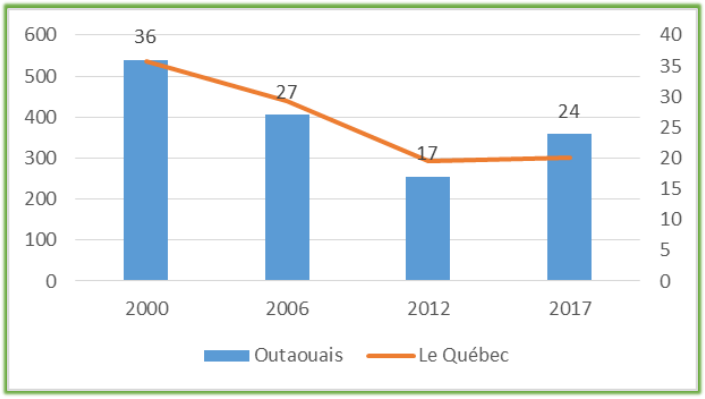


Figure 2. Change in the number of facilities holding a wood processing plant permit since 2000 in Outaouais and in Québec

[21] Institut de la statistique du Québec (2016).
[22] Bernier (2017).
[23] Databank of Official Statistics on Québec (2017).
[24] Beauregard (2015).

In 2017 there were twenty-four facilities holding a wood processing plant permit, including three pulp and paper plants, fifteen sawmills for softwood and hardwood, three energy cogeneration and production plants, and three plants in other categories.

Despite an upturn in activity since 2014, certain problems could curb expansion and competitiveness among forestry companies, namely, the lack of workers, low level of investment in research and development, and international competition.

The Sustainable Forest Development Act states that the supply guarantee gives the beneficiary the right, each year, to purchase a wood volume from Crown-owned forest land in one or several regions, with a view to supplying the wood processing plant where the guarantee is in effect. The guarantee indicates the annual wood volume by species or by group of species that may be purchased each year by the beneficiary from each of the regions covered by the guarantee.

To consult the forestry rights for the region, visit the MFFP Website at the following address:

http://mffp.gouv.qc.ca/les-forets/amenagement-durable-forets/les-droits-consentis/la-garantie-dapprovisionnement-ga/droits-forestiers-application-garanties-dapprovisionnement-ga/

6.5 Description and use of the region

6.5.1 Aboriginal nations

Two aboriginal reserves, Kitigan Zibi (community of Kitigan Zibi Anishinabeg) and Lac-Rapide (community of Lac-Barrière) are located within the regional boundaries of Outaouais. Other communities also travel to Outaouais—the community of Lac-Simon, the community of Kitcisakik, and the community of Wolf Lake. The subsistence activities of the First Nations communities living in Outaouais traditionally vary with the seasons and are based on hunting, gathering, fishing, and trapping. Many members of First Nations communities still practice these traditional activities. Today, the economy of the Algonquin communities is mostly based on the following industries: public services in education, health, housing, and municipal infrastructure development, and forestry, tourism, outfitting, arts and crafts, construction, transportation, trade, trapping, and agriculture.

Consideration of the concerns, values, and needs of Aboriginal communities who use forest land is an integral part of sustainable forest management.

6.5.1.1 Kitigan Zibi Anishinabeg

This community near Maniwaki has 3,189 members, including 1,588 who live off-reserve.[25] The Kitigan Zibi reserve was created in 1851 and has plenty of infrastructure for the provision of services to its members, including a department of natural resources. The community is also active in many different sectors of the economy such as logging and forest management and maple syrup production, with Awazibi Maple Syrup. The Kitigan Zibi Anishinabeg band council holds a harvesting license for timber used in a wood processing plant. The community has also entered into many agreements with Rexforêt in recent years under the Forestry Job Creation Program. These agreements allow members of the community to be trained for jobs in forestry, including brush clearing and tree cutting.

Members of the community have set up various research programs and participate in MFFP research projects on at-risk species such as the wood turtle and sturgeon.

6.5.1.2 Algonquins of Lac-Barrière

This community located near Lac Rapide in the La Vérendrye wildlife sanctuary has 764 members, 154 of whom live off-reserve.[26]

Various agreements have been entered into to help the community develop its economy. A committee, with representatives from the Québec government and the community, is finalizing an agreement that should result, among other things, in the implementation of integrated resource management plans and the creation of a natural resources management office for the land the community claims. These measures would make it possible to forecast the forest harvest produced by the claimed land. The supplies referred to in the supply guarantees in the forest management units in question could thus be maintained, and members of the community would be able to use local resources for their subsistence needs and other traditional activities.

6.5.1.3 Communauté Anicinape de Kitcisakik

The community of Kitcisakik is a small Angonquin community of 843 members located in the northern section of the La Vérendrye Wildlife Reserve in the Abitibi-Témiscamingue region of Quebec. The forest, as well as hunting, fishing and trapping activities, are at the heart of the community's lifestyle. The Anicinapek and the Kitcisakik are claiming certain rights on the land.

[25] Secrétariat aux affaires autochtones (2016).
[26] Secrétariat aux affaires autochtones (2016).

The Anicinapek and Kitcisakik Council created a department of natural resources (Aki) to handle forestry consultations. Aki's mission is to protect, defend and promote the Aki territory and the Kitcisakik cultural heritage to satisfy the needs of the community and of future generations by implementing land development and management projects and supporting the acquisition and sharing of traditional and scientific knowledge.

There is also a forest cooperative within the community, La Coopérative de solidarité Wenicec, which was created in March 2009. The Cooperative brings together qualified labour poised to execute mandates and quickly satisfy the need for forestry workers in the community. Since the Cooperative was created, the workers have accomplished a great deal, including wood cutting and processing, which has been tremendously beneficial for the community.

6.5.1.4 Conseil de la Nation Anishnabeg de Lac-Simon

The Anishinabeg de Lac-Simon community reserve is located in the administrative region of Abitibi-Témiscamingue. However, members may travel to a part of the area covered by this plan for traditional Aboriginal social or ritual activities or for gathering food.

6.5.1.5 Wolf Lake community

The Wolf Lake community reserve is located in the administrative region of Abitibi-Témiscamingue. However, members may also travel to a part of the area covered by this plan for traditional Aboriginal social or ritual activities or for gathering food.

6.5.2 Recreation and tourism

Forests are also destinations for recreation and vacations. The quantity and quality of the resources available in Outaouais make it a very popular area for recreational activities.[27]

The number of paths for walking, horseback riding, and cross-country skiing on public land has risen considerably in recent years.[28]

Canoe-camping routes can be found throughout the region. The main ones can be found along the Outaouais (Ottawa), Dumoine, Noire, Coulonge, Picanoc, de la Petite Nation, du Sourd, du Lièvre, and Gatineau rivers. For FMUs in the north, the trips organized by Société des établissements de plein air du Québec (SEPAQ) in the La Vérendrye wildlife sanctuary are also very popular. There are many rustic campgrounds located at various points along these routes.

[27] MRNF (2006).
[28] MERN (2012).

The Outaouais snowmobile trail system is well established. A significant section of the Trans-Québec system crosses the region, connecting Les Laurentides, Abitibi-Témiscamingue, and Eastern Ontario. Quad biking is also becoming more popular as it gives visitors access to previously undiscovered places.[29]

Amenities to help visitors enjoy a stay in the forest can be found close to these trails, including plenty of campgrounds, beaches, restaurants, lodging facilities, resorts, docks, and boat ramps. There are also a variety of visitor centers showcasing the local landscape and the region's cultural and natural resources. Large bodies of water offer potential for tourism development. In all, 2,287 recreational leases have been granted in the region.

Parc de la Gatineau, Parc national de Plaisance as well as Parc régional du Mont Morisette and Parc régional du Mont Cayamant are open to the public for low-footprint activities.

6.5.3 Structured wildlife areas

Structured wildlife areas (SWAs) cover 62.5% of the region's forest management units. The La Vérendrye and Papineau-Labelle wildlife sanctuaries account for 29% of the surface area subject to forest management in Outaouais. Eight controlled harvesting zones (ZECs) cover 23% of the region's forest land. Four of these zones are located entirely in Outaouais (Bras-Coupé-Désert, Rapides-des-Joachims, Pontiac, and Saint-Patrice). Two are shared with the Abitibi region (Capitachouane and Festubert). The smaller Lesueur and Petawaga ZECs crisscross the Outaouais region. The 25 exclusive-rights outfitters cover 10.9% of the area, in addition to 64 outfitters without exclusive rights that also operate in the region. There is also a community wildlife area shared with Les Laurentides, an area protected by order, an area under protocol, and two small managed lakes, but all these account for less than 1% of land subject to forest management in Outaouais.

[29] MRNF (2006).

Table 2. Structured wildlife areas in Outaouais

Category	FMU SURFACE AREA (HA)[30]	% FMU
Community wildlife area	11	0.001%
Area protected by order	8,490	0.3%
Area under protocol	10	0.001%
Small managed lakes	40	0.002%
Exclusive-rights outfitters	289,220	10.9%
ZECs	602,040	22.7%
Wildlife reserves	763,580	28.8%
Total	1,663,330	62.7%

[30] All calculations are based on the surface area under forest management on public land with forests managed by Outaouais.

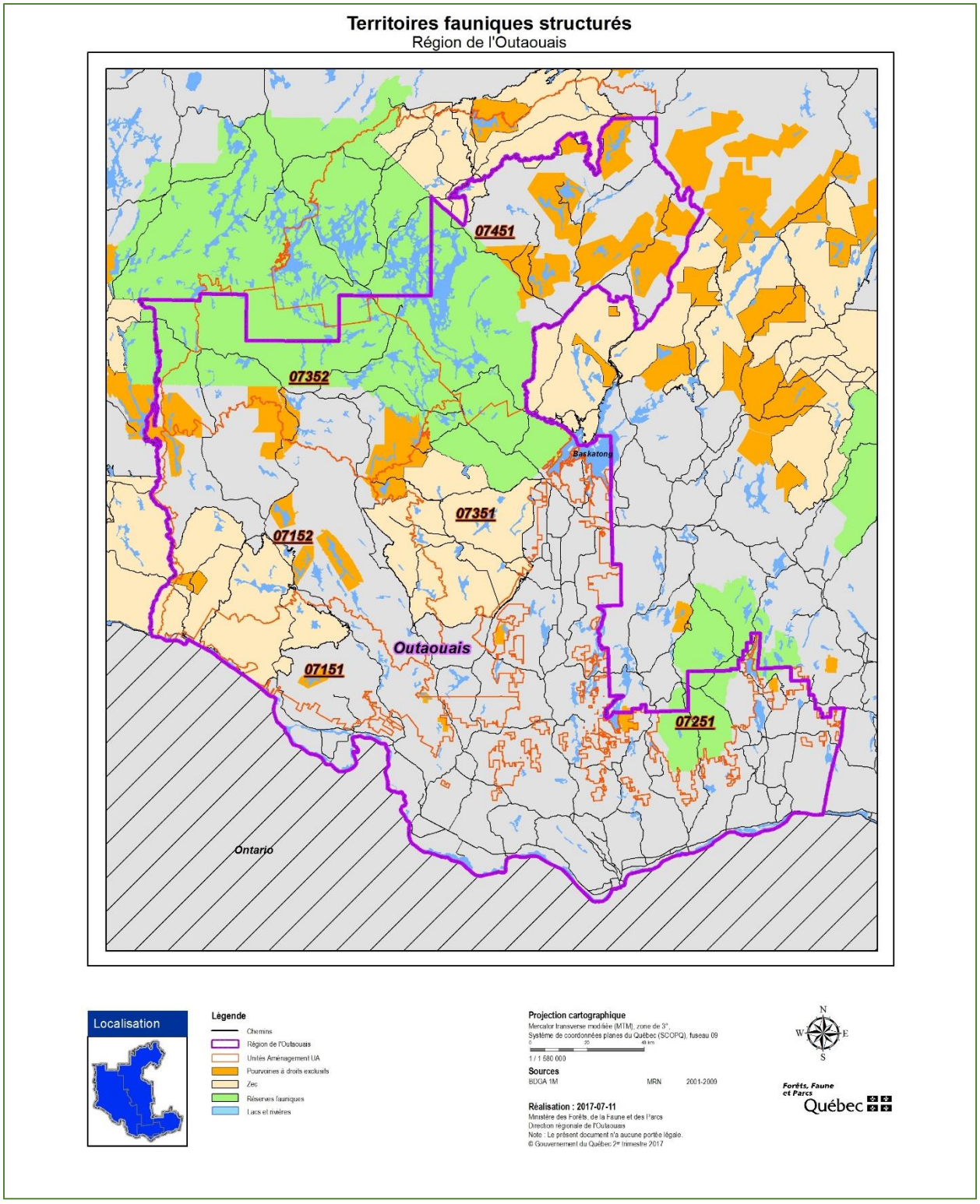


Figure 3. Main structured wildlife areas in Outaouais (Outfitters with exclusive rights (orange), Controlled harvesting zone (yellow), Wildlife reserves (green)

6.5.4 Wildlife activities (hunting, fishing, and trapping)

In a context of coexistence and respect for the various rights granted, it is very important to consider the concerns of wildlife resource users in the forest planning process.

6.5.4.1 Hunting and fishing

The Outaouais region is divided into five hunting zones that also apply to fishing, except Zone 10, which is split in two for hunting (10 East and 10 West). Zone 25 for fishing is a part of Zone 10, a narrow strip located in the south of the region, mostly along the Rivière des Outaouais (Ottawa River).

The main species hunted in Outaouais are moose, white-tailed deer, and small game (hare, ruffed grouse, etc.). In 2012 hunting generated tax revenue of almost $5 million in the region and created more than 273 jobs.[31]

The most popular species for fishing in Outaouais are brook trout, lake trout, walleye, pike, muskellunge, and largemouth bass.[32] In 2012 the fishing industry generated tax revenue of almost $14 million and created close to 735 jobs.[33] Data on hunting and fishing seasons and on the bag limits per species in each zone are available on the MFFP website.[34]

Table 3. Hunting and fishing zones in Outaouais

Zone		FMU Surface Area (ha)		% of the FMU in this Zone	
Fishing	Hunting	Fishing	Hunting	Fishing	Hunting
10*	10 East	909,700	795,600	34%	30%
	10 West		114,100		4%
11	11	21,500	21,700	0.8%	1%
12	12	922,600	923,000	35%	35%
13	13	431,300	431,300	16%	16%
14	14	365,900	365,900	14%	14%

* Zone 25, which is a portion of Zone 10, includes less than ten ha on public land under management.

[31] ECO RESSOURCES (2014).
[32] MRNF (2006).
[33] Eco Resources (2014).
[34] Hunting: MFFP (2016a) and fishing: MFFP (2016h).

6.5.4.2 Trapping

The Outaouais region has 12 furbearer management units (FBMUs) under regional control, except for Zone 7, which is managed by the Abitibi region. The rules for trapping seasons in each FMBU are available on the MFFP website.[35]

Outaouais has 294 trapping areas totaling 1,346,800 ha of FMUs. Almost 60% of this surface area is located in structured wildlife areas (ZECs and wildlife sanctuaries).

In 2012, trapping generated tax revenue of almost $230,000 and created 10 direct jobs. Muskrat, American marten, and raccoon are the species with the most economic spinoffs.[36]

6.5.5 Road infrastructure

The region is served by a large number of major roadways. Highway 50 and Route 148, part of the national highway network, cross the southern part of the region from east to west. Highway 5 and Route 105, connecting to Route 117, run north-south.

The need for a strategic network has been highlighted in the PRDIRT[37] to help solve the issue of maintaining accessibility to natural resources. In 2009 the Regional Committee for Forest Roads conducted a major consultation among public land stakeholders in Outaouais (local consultation panels) and presented Commission régionale sur les ressources naturelles et le territoire de l'Outaouais (CRRNTO) with a proposed strategic plan for the main network providing access to public land in Outaouais. The plan, approved by the Conférence régionale des élus de l'Outaouais (CREO) board of directors in 2009, included a 2,500 km strategic network for access to public land. In January 2012, a second version was adopted by CRRNTO and later by CREO. The network is made up of 1,900 km of forest roads and 132 km of municipal roads. This network was not defined according to road condition but rather according to what needed upgrading and maintained over time and with a view to making these a priority when planning investments. Accordingly, for some programs, it has become a priority criterion for defining investments.

[35] MFFP (2016i)..
[36] Eco Ressources (2014).
[37] CRRNTO (2011).

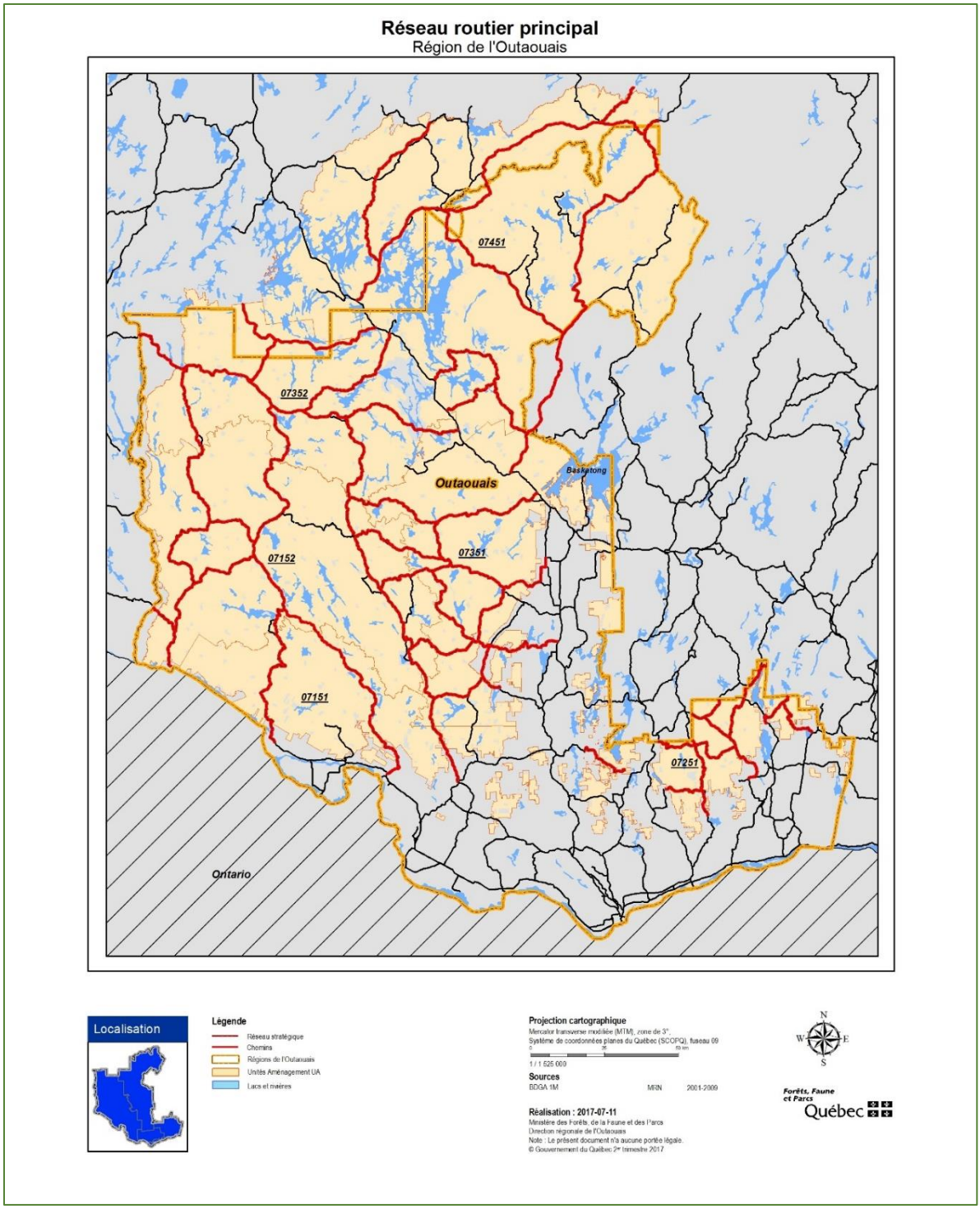


Figure 4. National road network and Strategic regional network

The region also has an excellent secondary road network, with bridges and culverts, connecting to the main access routes. The box below describes the main roads and infrastructure serving each forest management unit.

Road network and primary infrastructure

La Coulonge management zone	The main access routes to FMU 071-51 are the Bois Franc and Schyan roads. For FMU 071-52, the main access routes are the Bois Franc, Rapides-des-Joachim, and Usborne roads, which cross both FMUs from north to south.
Basse-Lièvre management zone	The main access routes are the roads to Baie de l'Ours, Lac Gagnon Ouest, Sioui, Le Smallian, and Saint-Denis. The western portion is well served by the municipal road network. There are numerous main forest roads in the Papineau-Labelle wildlife sanctuary, including Routes 1, 2, 3, 4, 12, 25, and 32.
Haute-Gatineau and Cabonga management zones	An excellent forest road network, which includes the Maniwaki-Témiscamingue, Lépine-Clova, Corneille, and Pomponne roads, supplements the provincial and municipal network. Some of the bridges in this network are critical for providing access to the area.

6.5.6 Historic and cultural sites

In terms of archeology and heritage, 86 historic monuments, none of which are on public land, are protected under the *Cultural Property Act*. Among the region's most important cultural sites are the known archeology sites linked to local Aboriginal history and to the route taken by the *coureurs des bois*. There are 9 archeological sectors (a sector is a group of sites) and 140 known archeological sites, 39 of which are located on public land.[38]

6.5.7 Hydrographic network and water infrastructure

Outaouais is a region dotted with lakes and rivers. There are some 15,000 lakes and reservoirs, including the Baskatong and Cabonga Reservoirs, accounting for 7.5% of the region's surface area. Six major rivers (Petite Nation, Le Lièvre, Gatineau, Coulonge, Noire, and Dumoine) run through the area and feed into a seventh, Rivière des Outaouais (Ottawa River).[39]

[38] MERN (2012).
[39] MRNF (2006).

6.6 Biophysical profile

6.6.1 Natural forest mosaic

The wide range of ecosystems can be seen in the forest composition, age group distribution, and stand structure and spatial organization. However, these variations are defined for the region, which exceeds the boundaries of the FMUs. The natural forest mosaic of each FMU corresponds to the forest profile before large-scale logging and can be described using the regional profile as a basis for comparison. This description applies to each bioclimatic subdomain. A map of the bioclimatic domains can be consulted at the following link: https://www.mffp.gouv.qc.ca/forets/inventaire/inventaire-zones-carte.jsp

Bioclimatic subdomains

FMU: 071-51	**Sugar maple-bitternut hickory stands** The sugar maple-bitternut hickory stand bioclimatic domain, located in the southern part of FMUs 071-51 and 072-51, covers the southwest of the province, where the climate is most favorable. This is where the southernmost flora in Québec can be found, including many thermophile species. Forests are extremely diverse in this area. Some of the species here are at the southern boundary of their distribution area. This is the case for the bitternut hickory, after which the domain is named, shagbark hickory, hackberry, black maple, swamp white oak, rock elm, pitch pine, as well as many bushes and shrubs. Other species that also grow in the north can be found here as well, such as sugar maple, fir, and spruce. This domain is not split into subdomains.
FMU: 071-51 *072-51* *073-51*	**Sugar maple-basswood stands in the West** The sugar maple-basswood stand bioclimatic domain is located to the north and east of the sugar maple-bitternut hickory stand domain. There is also a wide variety of flora, but many species are at the southern boundary of their distribution area. In areas with the right growing conditions, American basswood, American beech, ironwood, and butternut are mixed in with sugar maple, but are less common outside this domain. The distribution of red oak and rainfall patterns can be used to identify two subdomains, one in the west, which is drier, and the other in the east, which gets more rainfall.
FMU: 071-51 *071-52* *072-51* *073-51*	**Sugar maple-yellow birch stands in the West** The sugar maple-yellow birch stand bioclimatic domain covers the slopes and hills that border the southern part of the Canadian Shield and the Appalachians. It is located in the northernmost part of the deciduous forest subzone. Flora here is less varied, except at the best sites, and includes many boreal species that are commonly found throughout Québec. At mesic sites, yellow birch is one of the main species found alongside the sugar maple. American beech, red oak, and Canadian hemlock also grow here, but they are very rarely found beyond their southernmost boundary. This domain also marks the end of the American basswood and ironwood distribution area. Here, as in the entire deciduous subzone, windfall is one of the main features of forest dynamics. Abundant rainfall as well

	as the distribution of white and red pine stands split the sugar maple-yellow birch stand domain into two subdomains, one in the east and one in the west.
FMU: 071-52 *073-51* *073-52* *074-51*	**Balsam-yellow birch stands in the West** The balsam-yellow birch stand bioclimatic domain is an ecotone, i.e., it marks the transition between the temperate northern zone, where it is located, and the boreal zone. It runs from western to central Québec, between 47° and 48° latitude. It also outlines the Gaspé Peninsula and includes the Appalachians in eastern Québec, the Laurentian foothills, north of the St. Lawrence River, and the Lac Saint-Jean lowlands. Mesic sites here are populated with mixed stands of yellow birch and softwoods, such as balsam fir, white spruce, and cedar. Sugar maples grow here at the southern boundary of their distribution area. Spruce budworm epidemics and fires are the two main factors in forest dynamics. The abundance of yellow birches and pine stands drops off from west to east, helping identify two subdomains. The West subdomain is characterized by the overall presence of yellow birch-fir stands on mesic sites and the East subdomain by fir-yellow birch stands.
FMU: 074-51	**Fir-white birch stands in the West** The balsam-white birch stand domain covers the southern part of the boreal zone. Here the forest is dominated by stands of balsam trees and white spruce combined with white birch at the mesic sites. At less favorable sites, black spruce, jack pine, and larch are often mixed in with white birch or trembling aspen. Yellow birch and red maple only grow in the southern part of the domain. The spruce budworm is the main forest dynamics factor in this domain, because balsam firs are plentiful. However, fire also plays an important role. The fir-white birch stand domain can be split into two subdomains. In the West subdomain, the landscape is not very rugged. There is little in the way of steep terrain. The fire cycle is also shorter here, which explains the abundance of hardwood stands or mixed stands with shade-intolerant species (trembling aspen, white birch, and jack pine). Due to the influence of the ocean, rainfall is generally more abundant in the East subdomain. As a result, the fire cycle is longer here.

6.6.2 Habitats and wildlife resources

6.6.2.1 White-tailed deer yards

In Québec white-tailed deer are at the northern boundary of their distribution area. Winter is the main factor that limits the size of their population. At our latitude, snow depth, temperature, and wind can have a significant effect on the survival of white-tailed deer. To minimize heat loss and maximize their survival rate, deer take refuge in forests where the climate is more favorable and where they can create trails to easily access food and escape from predators. These areas are called “white-tailed deer yards” (WDYs).

A WDY is a wooded area of at least 250 ha where white-tailed deer gather during the period when snow depth is more than 50 cm or 40 cm (in areas south of the St. Lawrence River and west of Rivière Chaudière).

Most WDYs located on land in the domain of the State belong to the Québec protected areas network as Category IV protected areas[40], which are managed in order to preserve the habitats of the species they were designated for.

In Outaouais, WDYs cover an area of over 160,000 ha, 20% of which is land in the domain of the State. WDYs are located in FMUs 071-51, 072-51, and 073-51. Of the WDYs that are partly or completely on public land, ten are big enough to require a forest management plan (see Section 7.1.8.2). Together, they account for 4% of the region's managed land.

Table 4. White-tailed deer yards located at least in part on public land in the Outaouais region

WDY	Total Surface Area in Outaouais (ha)	FMU Surface Area (ha)	FMU	Management Plan in Place (Yes/No)
Aylwin Station	612,000	60	072-51 and 073-51	No
Davidson	4,750	1,217	071-51	Yes
Duhamel	12,280	7,700	072-51	Yes
Lac de la Sucrerie	730	310	072-51	No
Lac de l'Orignal	350	20	072-51	No
Lac des Trente et Un Milles	31,410	11,660	073-51	Yes
Lac du Goéland	410	10	072-51	No
Lac Gagnon	280	280	072-51	No
Lac Gardiner	450	150	072-51	No
Lac Gareau	350	10	073-51	No
Lac Heney	12,820	1,420	072-51 and 073-51	Yes
Lac Larivée	830	50	072-51	No
Lac Long	530	300	072-51	No
Lac Manitou	1,650	590	072-51	Yes
Lac McFee	2,800	990	072-51	Yes
Lac Morin	280	20	072-51	No
Lac Papineau	1,570	10	072-51	No
Lac Rond	890	840	073-51	Yes
Lac Trilby	660	40	073-51	No
Lady Smith	19,120	3,780	071-51	Yes
Notre-Dame-de-la-Paix	4,420	10	072-51	Yes
Petit lac Plat	140	140	072-51	No
Point Comfort	470	130	073-51	No
Val-des-Bois	480	50	072-51	No
Venosta	14,930	3,260	071-51 and 072-51	Yes
Total	**724,600**	**33,047**		

[40] MDDELCC (2017).

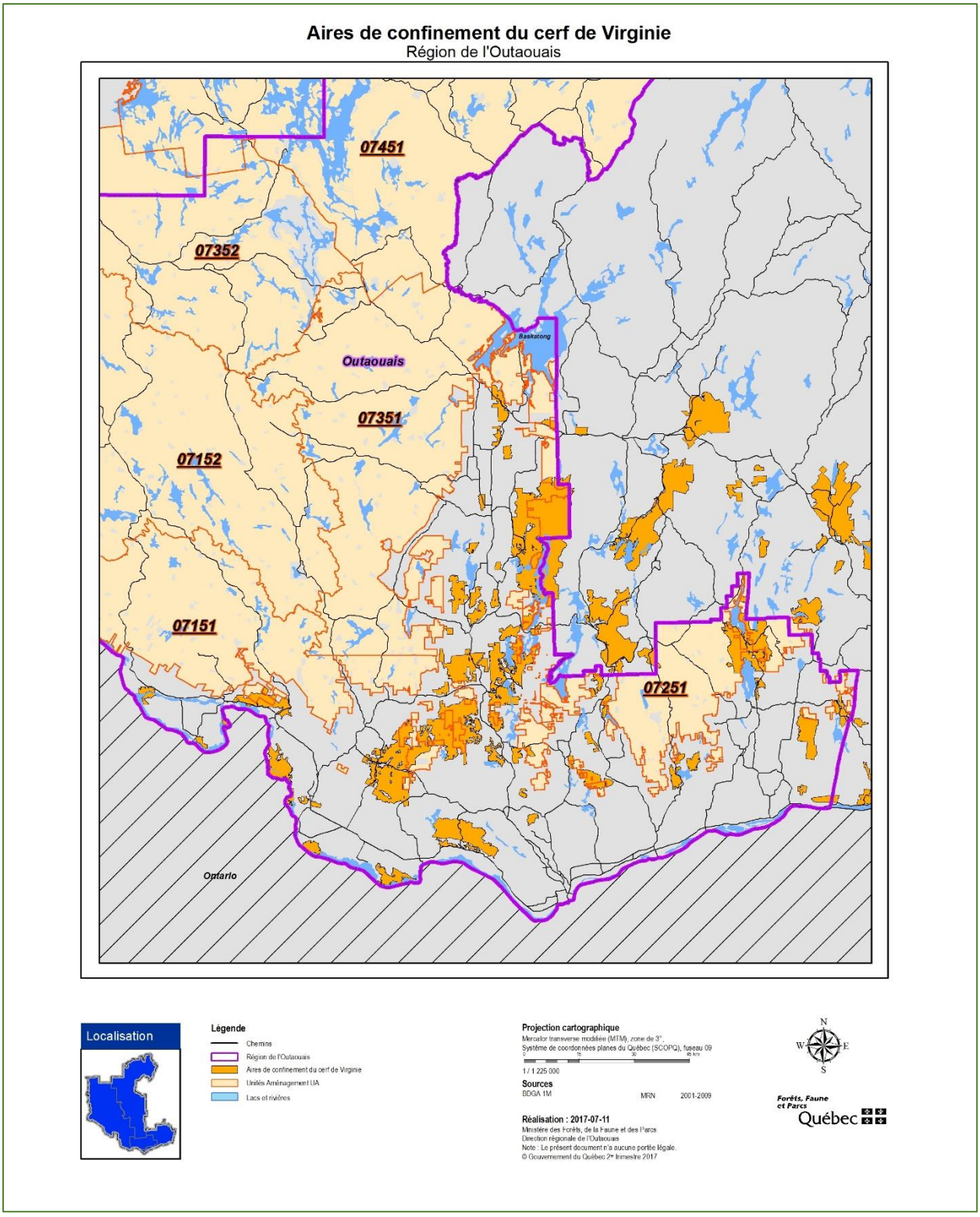


Figure 5. White-tailed deer yards in Outaouais

6.6.3 Forest timber resources

The descriptive data for forest timber resources come from the database provided by Bureau du forestier en chef (Chief Forester's office, BFEC) for calculating the 2015–2018 allowable cut.

The volume of merchantable timber growing in the region subject to forest management is assessed at 257 million cubic meters. Tolerant hardwoods account for almost 30% of this figure. Paper birch and other intolerant hardwoods make up almost another 30%. Boreal softwoods such as balsam fir, spruce, jack pine, and American larch (FSJA) account for almost 24%. Other temperate softwoods such as white and red pine, eastern hemlock, and eastern white cedar make up the remaining 16%.

The figure below shows the breakdown by group of species.

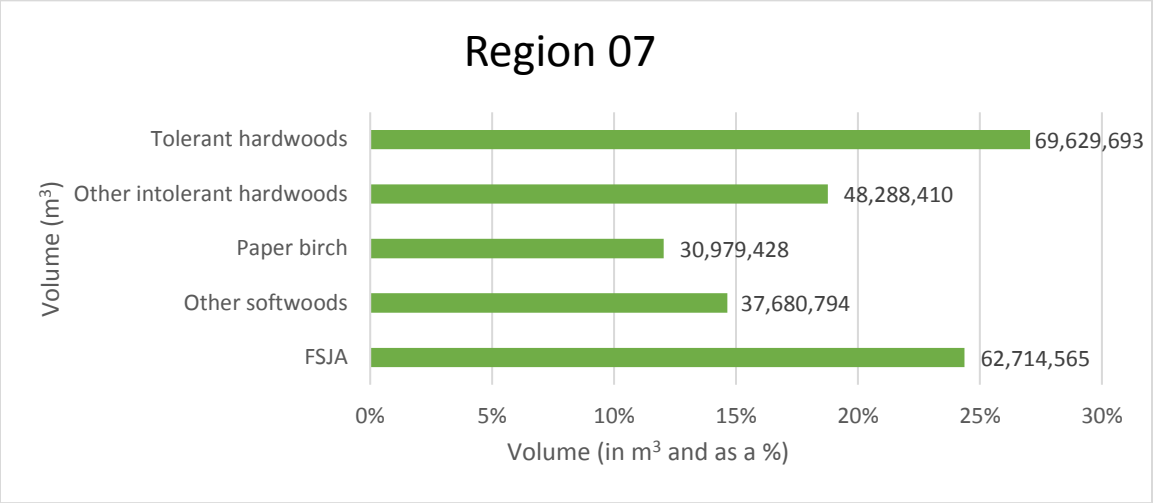


Figure 6. Volume of standing merchantable timber (in m^3 and %)

The next figure shows the breakdown of surface area by main type of forests subject to forest management in the region

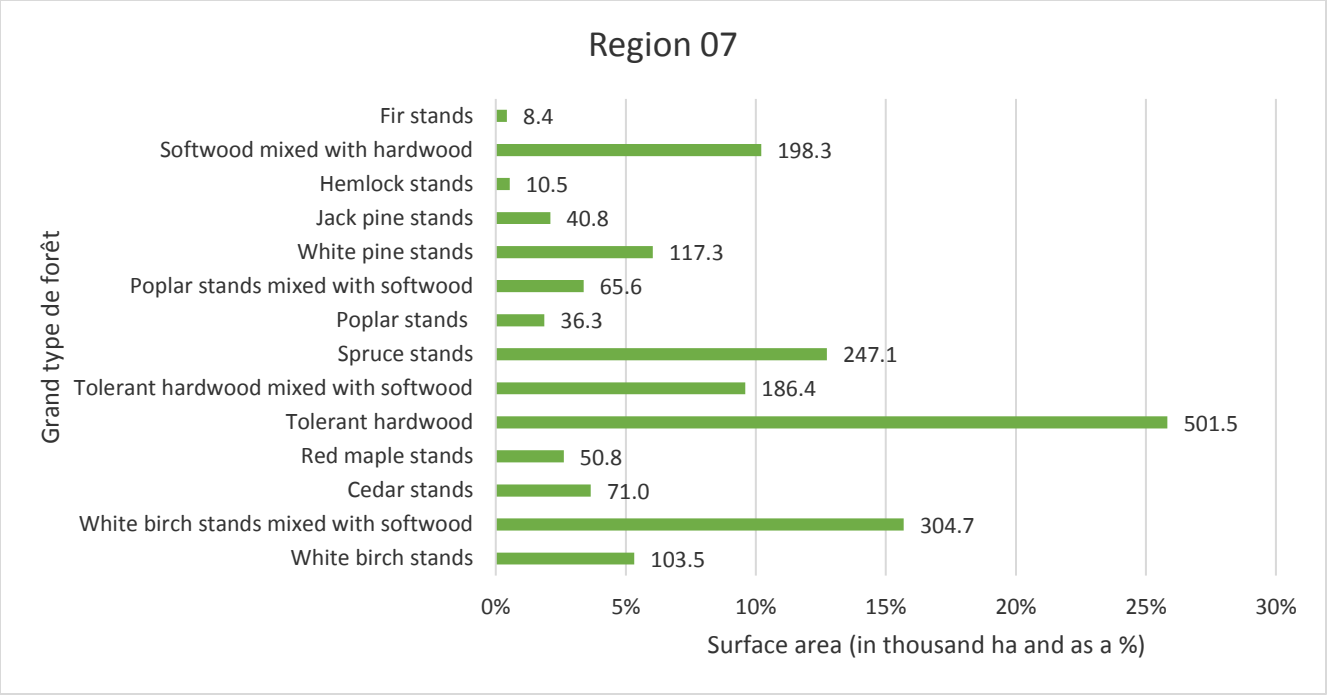


Figure 7. Surface area by main type of forest (% and thousand hectares)

The figure on the next page shows the types of forest cover in the region—softwood (dark green), mixed (orange), or hardwood (light green).

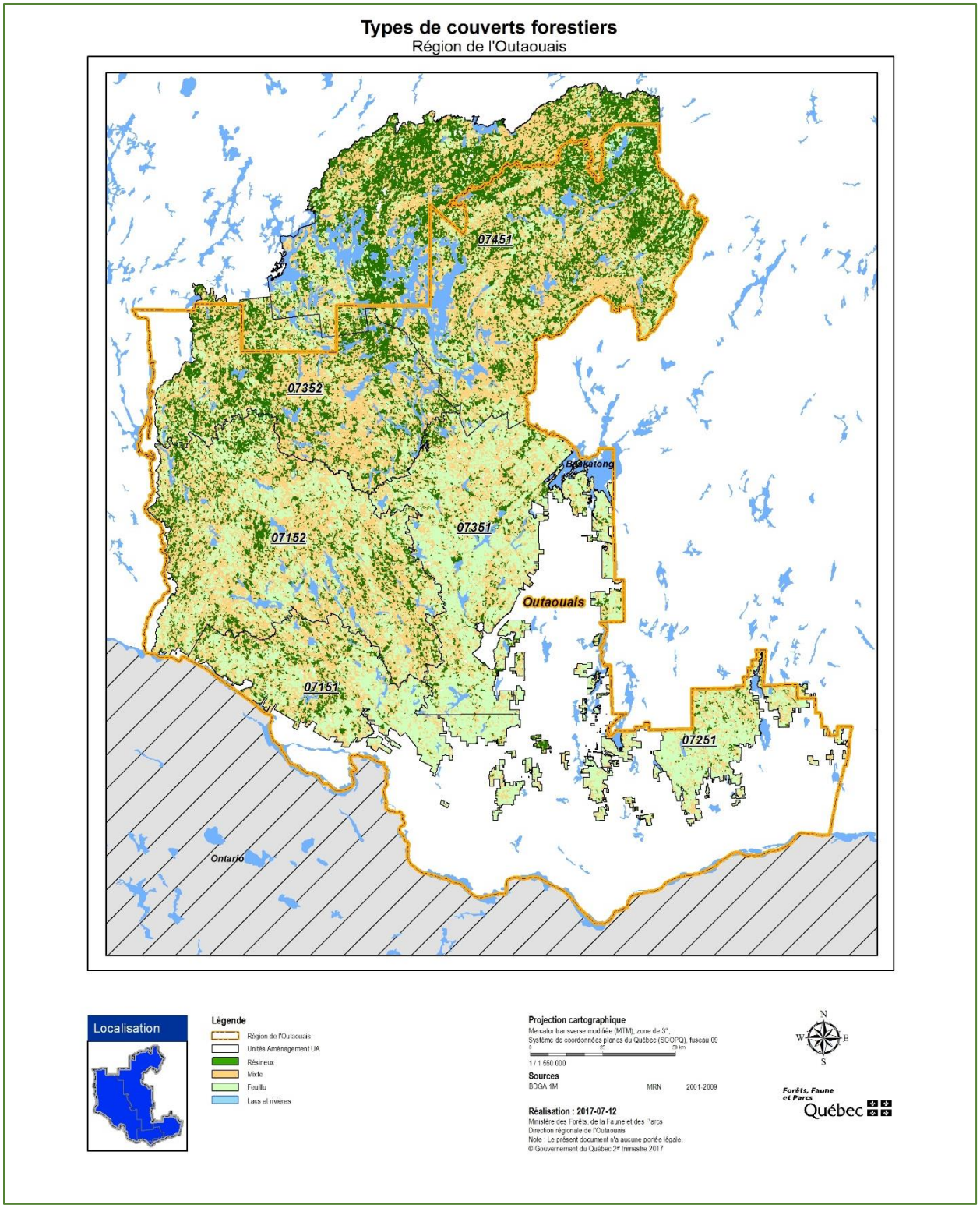


Figure 8. Types of forest cover

Forest evolution is measured according to age for forest with even-aged structure, i.e., forests made up of intolerant hardwoods and boreal softwoods. The land covered by such forests accounts for 54% of the surface area subject to management (Figure 9), close to 40% of which is in the 70-year-old age group.

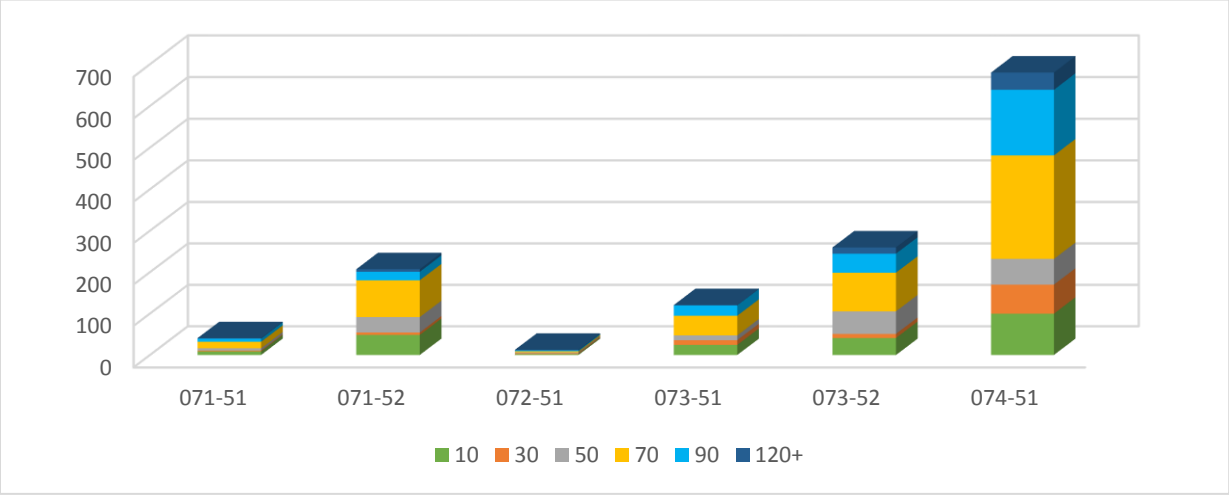


Figure 9. Surface area measured by age group per FMU (in thousand hectares)

Forests with uneven-aged structure, mostly made up of tolerant hardwoods and temperate softwoods, represent 46% of the surface area subject to management in the region (Figure 10). The evolution of these forests is monitored by measuring the basal area (BA).[41] Forests with a basal area below 18 m^2/ha, between 18 and 24 m^2/ha, 24 and 30 m^2/ha and exceeding 30 m^2/ha respectively represent 6%, 51%, 38% and 5% of the area.

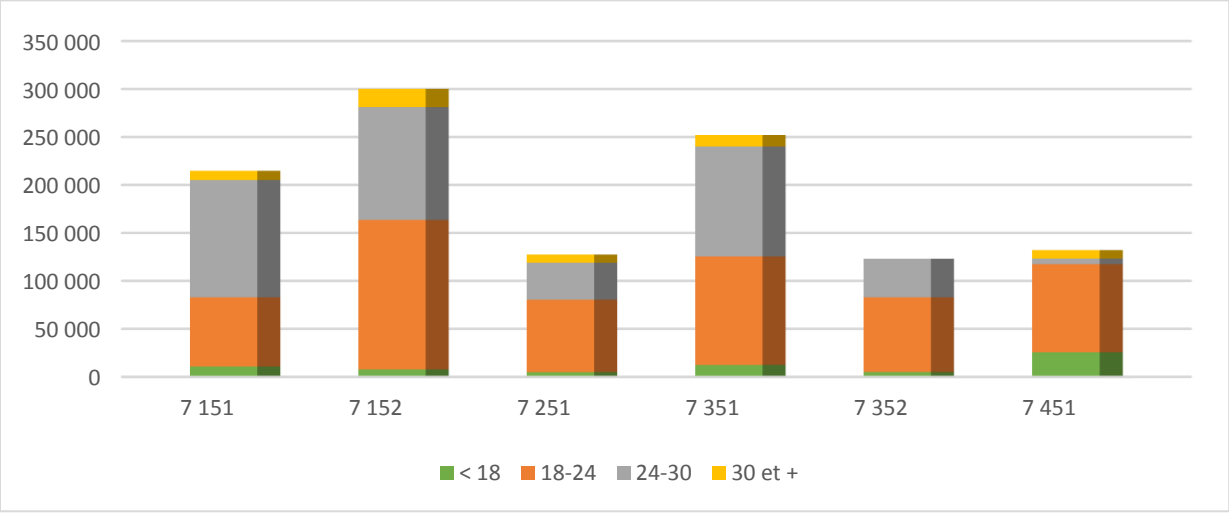


Figure 10. Surface area measured by basal area group per FMU (in thousand hectares)

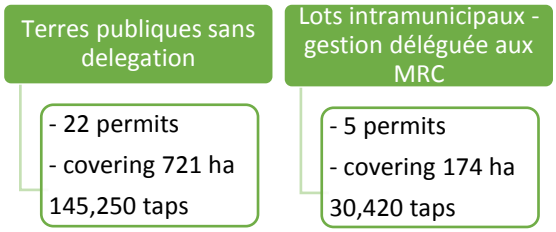
[41] Basal area, measured in square meters per hectare, is the total surface area of the cross sections of all tree trunks measured at breast height (1.3 m).

6.6.4 Forest non-timber resources

The harvest of non-wood forest resources[42] remains marginal on public lands in the Outaouais Region, with the exception of maple syrup production, which is quite widespread in some areas.

The maple product development potential in the Outaouais Region is quite significant. According to a 2002 assessment, stands with good potential for maple product operations in public forests cover more than 120,000 ha[43]. A 2016 potential assessment demonstrated gross potential for 131,000 taps on public land. It is based on the stand characteristics according to the provincial forest inventory. Nonetheless, taking into consideration the proximity of roads and power lines, this area drops to below 9000 ha. This means there is potential however investments are required to ensure its development.

Presently on public lands, 27 permit holders are active on a surface area of around 895 hectares totalling a capacity for slightly more than 175,670 taps.



In the region, a few clients have shown an interest in picking wild mushrooms. We also know that people pick berries on public land. These activities do not require a permit and are free. With respect to PFNL, where harvesting requires a permit, such as for Canada yew and biomass harvest, no permits have been issued in recent years with the exception of a single biomass project in 2017.

The potential of non-timber forest products for the Outaouais region was set out in the PRDIRT action plan drawn up by CRRNTO in 2010.[44] To date, no action has been taken. Accordingly, knowledge on this topic at the regional level remains incomplete. At the provincial level, the MFFP monitors the development of the PFNL industry by monitoring the acquisition of knowledge.

[42] Non-wood resources. For example, non-wood forest products include the following: Canada yew, shrubs, branches, cones, bark, resin, sap (including maple sap), leaves, mushrooms, moss, wild plant seeds for horticultural purposes, seeds (nuts), fruit (blueberries, raspberries, etc.), roots, tubers and rootstock.
[43] Forget, Mouton and Doyon (2002) cited in CRRNTO (2011).
[44] CRRNTO (2011).

6.7 Exotic species in plantations

The use of exotic species in plantations is a sensitive topic in forest certification. The primary goal is to boost timber production in certain well-defined areas of the region. According to the Invasive Species Specialist Group (ISSG), the exotic species used in plantations in Québec are not considered invasive.

According to data from the electronic system for monitoring plant orders, since 2002 only the hybrid poplar (HYP) has been subject to reforestation on public land. Since 2000 the total surface area of HYP plantations has stood at 2,000 ha, mostly in FMU 073-51, with smaller quantities in FMUs 071-51, 071-52, and 073-52.

For more information on exotic species, go to the Invasive Species Specialist Group's website at www.ISSG.org.

PART 3: FOREST MANAGEMENT OBJECTIVES

7. Forest management issues and objectives

Stakeholders in the forest industry and the general public across Québec were consulted for input on SADF. The strategy describes a vision for moving forward in sustainable forest development. The challenges, guidelines, and objectives provide a framework for addressing the ecological, social, and economic issues caused by forest development.

A number of objectives have been put forward to resolve ecological issues, including the preservation of natural forest attributes, such as:

- Age structure
- Spatial organization of forests with fir stands
- Plant composition
- Internal structure of forest stands and dead wood
- Young dense forests
- Wetlands and riperian environments
- Sensitive species
- White-tailed deer yards
- Wildlife sites of interest
- Threatened and vulnerable species

Other objectives address issues relating to forest productivity and the creation of wealth, such as:

- Increased timber production
- Production of value
- Production of wood volumes
- Profitability of investments

The management objectives targeted for all FMUs in the region include the objectives defined on a provincial level under the SADF, those defined by the LILRMP, and those defined according to the regional context.

7.1 Ecological issues

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

To put ecosystem-based management into practice, the SADF provides for an analysis of the ecological issues on a local level. Solutions tailored to the local context are rolled out for each FMU, based on knowledge of the dynamics of natural disturbances, climate, and the physical environment and on understanding how these factors affect the natural forest.

The issues listed in sections 7.1.1 to 7.1.7 (except 7.1.2 - Spatial organization) are addressed in separate documents setting out the "values, objectives, indicators, and targets" for each topic. These documents are commonly referred to as "**VOIT documents**." The indicators and targets for ecological issues are set out in Table 10, Section 8.1.

Anyone who submits a request to the MFFP can obtain VOIT files, which outline the situation according to set targets and specify the terms for monitoring indicators.

The MFFP published the document entitled "Intégration des enjeux écologiques dans les plans d'aménagement forestier intégré de 2018-2023"[45]. This publication is composed of several booklets containing the information necessary to analyze each ecological issue identified by the MFFP and develop appropriate solutions:

- Booklet 1.1 - General concepts relating to ecosystem and forest development
- Booklet 2.1 - Issues relating to forest age structure
- Booklet 3.1 - Issues relating to spatial organization in spruce-moss forests.
- Booklet 3.2 - Issues relating to spatial organization in pine forests
- Booklet 3.3 - Issues relating to spatial organization in maple forests
- Booklet 4.1 - Issues relating to plant composition
- Booklet 5.1 - Issues relating to internal stand structure and dead wood
- Booklet 6.1 - Issues relating to riparian areas
- Booklet 6.2 - Issues relating to wetlands

[45] JETT E et coll. (2012).

- Booklet 7.1 - Issues relating to threatened or vulnerable species
- Booklet 7.2 - Issues relating to development-sensitive species

The complete references in these booklets can be found in the bibliography for this document[46].

7.1.1 Issue relating to forest age structure

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

Issue	Scarcity of old-growth forests and overabundance of stands undergoing regeneration
Management objective	Ensure that the age structure of managed forests resembles that of natural forests.

The MFFP target for the province is for at least 80% of the FMU's surface area to have an age structure that differs slightly or moderately from natural forest.

The abundance of "regeneration" and "old-growth" development stages is used to analyze this issue and determine the levels of alteration in relation to natural forests. The level of alteration used to set management targets is the level associated with the stage that requires the most restoration work. The methodology used to determine the degrees of alteration is described in the first chapter of booklet 2.1 - *Issues relating to forest age structure*[47], and is partly reproduced in the associated VOIT file.

To be ecologically coherent, the analysis of issues relating to age structure must be carried out on a sufficiently large area for the forest characteristics to reach a balance with natural disturbances. The bigger the scope of the disturbance, the larger the area must be to achieve this balance. In practice, it is considered that the appropriate spatial scale for this analysis is a maximum of 500 km^2 for yellow birch and maple nurseries, 1000 km^2 for white oak nurseries, and 2500 km^2 for spruce-moss forests. These sizes

[46] MFFP (2015 a, b, c, d), MFFP (2016c, d, e), MFFP (2017b, c, d, e).
[47] MFFP (2016c).

take into consideration the fact that natural disturbances such as fires are more widespread in the spruce-moss forests. In some cases, a management unit can overlap three bioclimatic fields.

When the condition of the forest age structure in a management unit does not allow for the ministerial target to be immediately achieved, developers must prepare an ecological restoration plan. Nonetheless, in the Outaouais Region, the ministerial target was attained despite its significant development history (see figure 11). As ecosystem-based management seeks to reduce the variation between natural and managed forests, it would be inappropriate to set a target much lower than the current status. TRGIRTO has discussed age structure to identify targets able to simultaneously reach the social, economic, and ecological objectives.

The inclusion of this issue in the allowable cut calculation is based on criteria that define the level of alteration thresholds for the “low, moderate, high” classes as well as the provincial target set in 2013. The table below shows the predicted change in the proportion of TUAs between 2013 and 2018, based on the ACC and according to the alteration classes determined at the time.

Table 5. Change in the level of alteration of TUAs per FMU between 2013 and 2018 based on 2013 thresholds

Forest Management Units	TUA % per Alteration Class in 2013			TUA % per Alteration Class in 2018			Increase in the “Low” Class in 2018
	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	LOW
7151	100%	0%	0%	100%	0%	0%	0%
7152	75%	25%	0%	81%	19%	0%	+ 6%
7251	25%	75%	0%	75%	25%	0%	+ 50%
7351	58%	33%	8%	83%	17%	0%	+ 25%
7352	80%	20%	0%	100%	0%	0%	+ 20%
7451	66%	34%	0%	100%	0%	0%	+ 34%

The class thresholds were increased in 2016.[48] The new thresholds and new targets will be included in the 2023–2028 ACC. The table and figure below show the current level of alteration, based on these new thresholds. As the management strategy in the 2018–2023 TIFMP was not subject to a new ACC, no restoration plan has been implemented for this timeframe. This decision is based on the fact that the surface areas where work

[48] MFFP (2016c).

affecting age structure was actually carried out is lower than expected, making it possible to re-establish the characteristics required to change classes.

Table 6. Level of current alteration per TUA based on the new thresholds

Forest Management Units	TUA % per alteration class		
	LOW	MODERATE	HIGH
7151	100 %	0%	0%
7152	63%	31%	6%
7251	0%	100%	0%
7351	42%	50%	8%
7352	90%	10%	0%
7451	94%	6%	0%

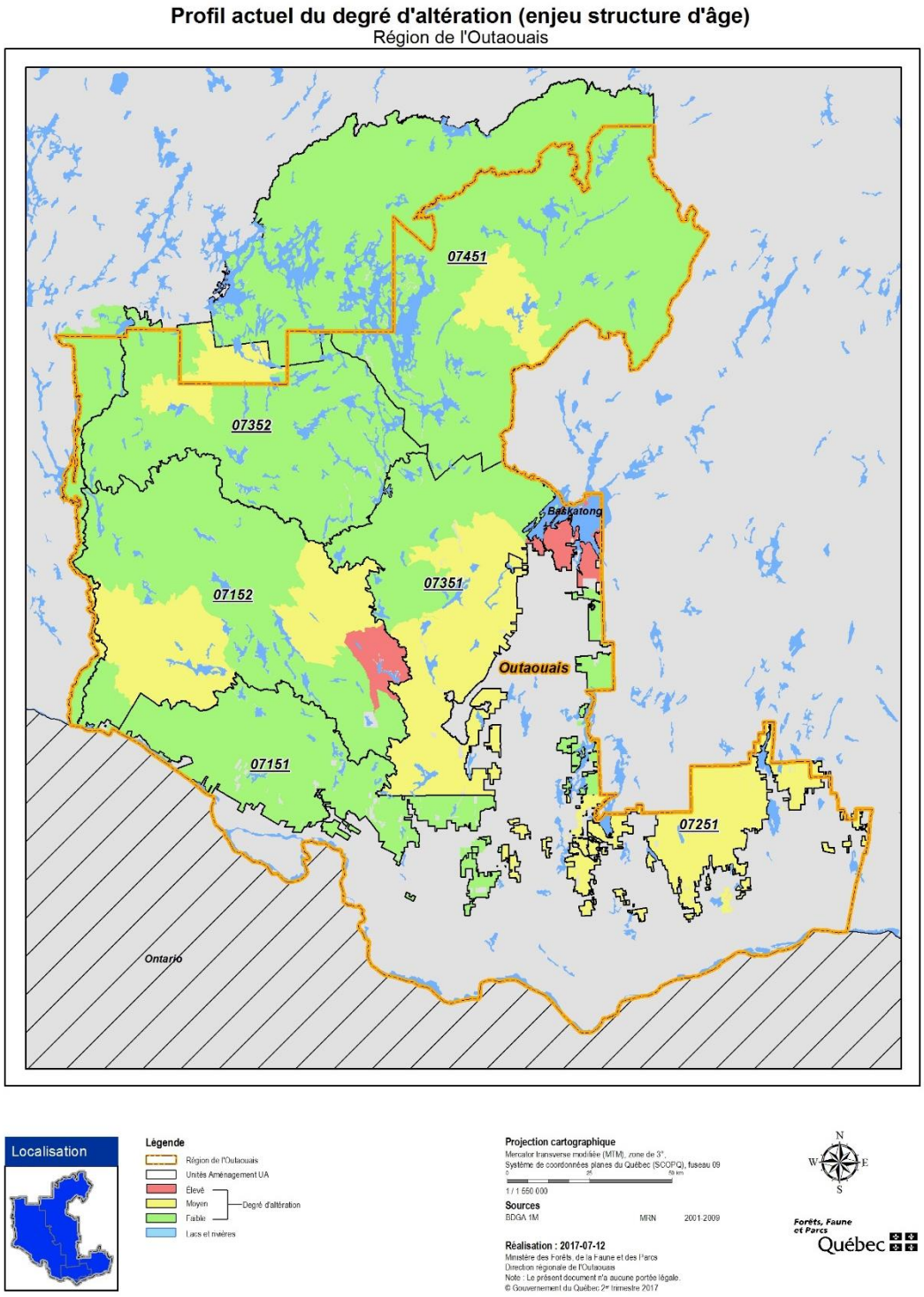


Figure 11. Current profile of the level of alteration (low (green), moderate (yellow), high (red)) based on these new thresholds

7.1.2 Issue relating to the spatial organization of forests

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

Issue	Discrepancy between the spatial attributes of natural forests and the attributes created by block cutting and cutting with protection of regeneration and soils (BCU-CPRS) in fir stands.
Management objective	Foster the preservation or restoration of key attributes associated with the spatial organization of forests found in natural fir stands.

From this perspective and in keeping with what has already been done in the forest, the MFFP is working on a new approach to the spatial distribution of cutting that is better adapted to the nursery context and the plan for natural disturbances for provincial introduction in 2023.

Until then, the Direction de la gestion des forêts de l'Outaouais will be participating in development efforts so that this new spatial organization method for cutting takes into consideration the specific characteristics of the forests on its territory. So far, the DGFO has presented mosaic cutting substitution standards for management unit 073-52 for the 2017-2018[49] application year in reference to the 1st paragraph of the LADTF. After the first year of experimentation, changes were made to the measures applicable in 2017-2018. These changes relate to the tabling of a new version of the waiver applicable in 2018-2019 for this same FMU. Other measures could be tested for this same FMU during the period covering this TIFMP.

The main objective of the substitution approach is to promote the maintenance or restoration of key attributes relating to the spatial organization of forests found natural nurseries, thereby helping to support ecological processes and biodiversity. Furthermore, the economic and social imperatives relating to the sustainable development of forests is such that the substitution approach to adopt must ensure the financial profitability of harvest operations as well as the social acceptability of solutions devised to achieve all the objectives. The synergistic effects of some of the measures sometimes allow us to simultaneously satisfy to several objectives that were previously difficult to reconcile, such as the economic and ecological aspects.

[49] MFFP (2018)

The MFFP also began work to apply this new spatial distribution approach to cutting in maple groves.

7.1.3 Issue associated with the plant composition of forests

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

Issue:	Increasingly rare or declining forest species
Targeted species	• White pine • Red pine • Red oak • Yellow birch
Management objective	Maintain or increase the proportion of increasingly rare or declining forest species.

Although not directly included in the VOIT documents on the plant composition issue, other species are being taken into account on this topic:

Butternut

White walnut is on the list of vascular plants likely to be designated as threatened or vulnerable in Québec and is also a designated endangered species listed in Appendix 1 of Canada's *Species at Risk Act*. Canker disease is attacking butternut throughout the entire distribution area.

Black ash

The emerald ash borer is very aggressive in rural areas and its effect on forests is hard to assess. It has already caused significant damage in cities (almost all trees have died).

Eastern white cedar

It is difficult to increase the proportion of eastern white cedar through natural regeneration because of the high numbers of white-tailed deer.

7.1.4 Issue associated with dead wood and attributes of the internal structure of forest stands

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

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

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

Issues:	1) The trend towards an increase in partial cutting with substantial removal, as well as the selection of rotation periods, explains why there is a significant reduction in the abundance of old-growth stands with a complex structure, and, as a result, of large dead wood and its recruitment dynamic. 2) The habitat needs of sensitive species associated with dead wood (e.g., the pileated woodpecker) could serve as markers for the quantity of dead wood to be maintained in harvesting sectors. 3) In areas subject to a total cut, an adequate number of biological legacies, including, for example, residual trees and dead wood, must be maintained to allow for the continuity of ecological processes at the start of succession and thus speed up the development of a more diverse structure in the future stand.
Management objectives	Increase the number of biological legacies in total cuts Maintain complex structure attributes in stands subject to partial cutting

Non-harvested areas adjacent to cutting zones help meet the objectives associated with maintaining high-caliber dead wood and with its recruitment.

7.1.5 Issue associated with second-growth forests

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

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

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

At this stage of development, wildlife is diverse and species are abundant. The systematic use of cultivation processes could have significant consequences on wildlife and on biodiversity in general, because the sapling stage is important for many key species in the ecosystem.[50] To maintain the anticipated forest performance, the non-treated area

[50] Bujold et al. (2004).

must be limited to naturally regenerated stands. At all times, appropriate education initiatives could be carried out in artificially regenerated areas. The main biodiversity issues associated with cultivation processes are shown the box below.

Issues:	1) Scarcity of young stands of dense saplings and, over time, of dense stands at various stages of development (complex structure) 2) Less cover for shelter 3) Significant scarcity of available food in the short term 4) Loss of heterogeneity over large areas 5) Desertion of the treated areas by many animal species
Management objective	Reduce the discrepancy between the current forest and the natural forest by preventing the scarcity of complex structures that have been simplified.

7.1.6 Issue associated with wetlands

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

Currently, 8% of Québec's wetlands are in the protected areas network, although the government has undertaken to increase this to 12%. In 2015, as part of the SADF, MFFP undertook to help define new statuses for protected areas in forests, by developing the concept of "wetlands of interest" (WOI). A WOI is an area with high ecological value and one that is very important for maintaining biodiversity.

Issue:	More protection for small wetlands of significant ecological interest.
Management objective	Grant increased protection to a group of sites specifically targeted according to various ecological criteria.

The MFFP used different geomatic layers to assign a score to the wetlands inside the management units. The criteria were divided into two categories, specifically those relating to the intrinsic value of the wetlands (diversity, rarity, area and integrity) and those relating to added value (presence of an threatened or vulnerable species, proximity to a

wildlife site of interest, a lake or a protected area. The process made it possible to quickly identify the most interesting wetlands. Other factors were also considered including the cutting history, future forest planning, the presence of roads, knowledge of the land, and the creation of enclaved stands.

Given the large protected areas found in the region, more WOIs have been added to ensure better distribution across the territorial units of analysis (TUA). This breakdown protects wetlands across the entire reference area and thus improves the spatial distribution of WOIs. As stated in Provincial Booklet 6.2 - *Issues relating to wetlands*, the addition of protection strips around the wetlands is necessary to mitigate edge effects, particularly for the smaller wetlands. Further to allowing transfers between wet and dry lands, these strips support rich biodiversity. To follow the same logic for “wetlands” type of wildlife sites of interest and certain protected areas, a 60m protection strip was usually added around the selected MHIs.

7.1.7 Issue associated with riparian environments

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

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

The regulatory protection granted to riparian environments includes the maintenance of a wooded border of a predetermined width and a ban on forest machinery. These measures will be included or enhanced under the RADF, which will replace the RNI on April 1, 2018.

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

Issue:	Preservation of the integrity of riparian environments
Management objectives	1) Preserve a representative portion of the riparian environment 2) Preserve riparian environments of great ecological interest (rare, largely undisturbed environments that are home to species of great importance or that carry out ecological functions).

The selected indicators and targets correspond to the maintenance of a measure already in place with the application of OMPV 8 - Saving dead wood in developed forests, which entails leave 20% of wooded riparian border intact for a width of 20 meters.

7.1.8 Issue associated with species in need of special attention to ensure their survival

The forest is home to many species of flora and fauna. Forest management operations that alter various forest attributes can severely impact the abundance, distribution, and survival of these species. An ecosystem-based management approach is the first step in ensuring habitats and biodiversity are maintained. However, many species have specific needs that ecosystem-based management may not be able to meet. This is why taking the needs of species in precarious and sensitive situations into account in forest management is an important step.

Issue:	Consideration of the needs of species in precarious and sensitive situations, in forest management
Management objective	Ensure the habitat needs of species in precarious and sensitive situations are taken into account in forest management as part of the forest planning process:
Secondary objectives	1. Consider the habitat needs of sensitive species to document and verify the ecological issues in order to adjust ecosystem-based management targets and solutions so they include these needs 2. Observe the procedures or protection measures associated with wildlife habitats, such as • white-tailed deer yards • threatened and vulnerable species • wildlife sites of interest

7.1.8.1 Verification of the management targets with sensitive species

The ecological issues listed above are the first step in assessing discrepancies between natural forests and managed forests. They are what is known as a "coarse filter."[51] Species sensitive to forest management help verify this coarse filter established through ecosystem-based management. Indicators and targets associated with ecological issues have been established according to different representations of natural forest. Defining the habitat needs of species sensitive to forest management can help confirm whether these characteristics are maintained.

A province-specific approach has made it possible to identify the species sensitive to forest management[52] (Table 7). Species that are susceptible of reacting stronger than others to changes in the structure, composition and spatial organization of forest stands include the American marten, the pileated woodpecker, the northern flying squirrel, the fisher and the ovenbird. These are associated with critical habitat characteristics for wildlife: old hardwood and mixed stands, complex internal structure, dead wood and closed stands. A development that could satisfy the vital needs of these species would be suited to maintaining the diverse habitat conditions conducive to supporting other species. They were selected specifically based on the known negative reactions of their habitats to disturbance and the availability of scientific data relating to their needs. A process for qualifying their habitats and the requirements for meeting their vital needs is underway.

Table 7. Sensitive species of provincial interest for the assessment of ecosystem-based management targets

Forest regions	Sensitive Species	Ecosystem-based issue			
		Age Structure	Spatial Organization	Plant Composition	Internal Structure and Dead Wood
Balsam fir-white birch	American marten	X	X	X	X
	Pileated woodpecker	X			X
	Northern flying squirrel	X		X	X
Balsam fir-yellow birch	American marten	X	X	X	X
	Pileated woodpecker	X			X
	Northern flying squirrel	X		X	X
Maple	Fisher	X	X	X	X
	Pileated woodpecker	X			X
	Ovenbird	X		X	X

[51] The coarse filter approach seeks to meet the needs of most native species.
[52] F. Bujold (2013).

However, this initial "coarse filter" does not necessarily guarantee that the specific habitat features needed for all aspects of biodiversity will be preserved.[53] To supplement the approach, a "fine filter" has been added to the planning procedure. This fine filter targets species or certain groups of species whose requirements and specific habitat needs have not been met by the coarse filter approach alone. It is used to ensure that species of socioeconomic interest like the white-tailed deer or at-risk species will be preserved.

7.1.8.2 White-tailed deer yards

The Guide d'aménagement des ravages de cerfs de Virginie[54] (Guide to Managing White-tailed Deer Yards) makes recommendations for maintaining stands for shelter, food and shelter, and food within a white-tailed deer yard. These recommendations are based on key features of the deer's habitat. The management target is to maintain the habitat quality in the white-tailed deer yards.

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

7.1.8.3 Threatened or vulnerable species

All species of flora and fauna have their own characteristics and are important, whether for their ecological, scientific, nutritional, economic, medicinal, cultural, or social value. Through the *Act respecting threatened or vulnerable species*, the Québec government is committed to preserving all genetic biodiversity in the province.[55]

A significant number of wildlife and vegetation species are presently in a precarious situation, specifically because their distribution area is restricted, or their numbers are already low. Several of these species are associated with the forest setting. Consequently, they are generally sensitive to forestry operations. These species

[53] Jette et al. (2012).
[54] Hébert et al. (2013).
[55] http://www.mddelcc.gouv.qc.ca/biodiversite/especes/

therefore need special attention because the disappearance of one or more would be a loss for biodiversity.

The protection of threatened and vulnerable species, and of species liable to become threatened is part of the forest development process. In Quebec, threatened and vulnerable species in public forests used for forest development are protected either by law or by an administrative agreement that is in place between the MFFP and the ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC)[56]. This agreement was adopted in 1996 to preserve threatened and vulnerable species in Quebec's forests. It outlines protection measures and the mechanisms required to implement these. Numerous threatened or vulnerable wildlife and plant species benefit from special protection measures during forestry operations in public forests. The approach selected to respond to the issues faced by threatened or vulnerable species is explained in section 8.1.3 of this document.

Threatened or vulnerable protected species found in Outaouais

Animal species

- Landlocked Arctic char
- Bald eagle
- Four-toed salamander
- Peregrine falcon
- Wood turtle

Plant species

- Walking fern
- American ginseng
- James' monkeyflower
- Butternut
- Ram's head lady's slipper
- Showy lady's slipper
- Squawroot
- Wild leeks

7.1.8.4 Wildlife sites of interest

A wildlife site of interest (WSI) is defined as a:

> "specific location comprising one or more biological or physical factors conducive to the maintenance or development of a wildlife population or community whose biological or social value renders it remarkable in the local or regional context."[57]

In this region, most areas designated as WSIs are located in and around aquatic habitats. These sites were chosen to protect lakes, watercourses, or habitat components that are in scarce environments, meet the criteria for significant productivity of fish of economic interest, or include protection measures for sensitive populations (see Section 7.1.8.4).

[56]Gouvernement du Québec (2010).
[57] MFFP (2015e)

Various provisions in Québec law (the *Act respecting the conservation and development of wildlife*, the *Regulation respecting wildlife habitats*, the *Regulation respecting standards of forest management for forests in the domain of the State*, and the *Act respecting threatened or vulnerable species*) protect wildlife heritage. However, some sites of regional importance for wildlife merit additional attention and protection.

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

Section 8.1.4 presents the measures applicable to wildlife sites of interest.

7.2 Wood production taking into account ecology at the sites and the objectives pursued

One of the SADF objectives is to make the best possible use of the wood and other resources forests can produce and of what forests can offer in terms of functions, while observing the production capacity of forest ecosystems.

Silviculture makes it possible to improve what forests produce. To help regulate silvicultural activities, MFFP has produced a series of guides to silviculture.[58] The guides contain scientific knowledge to help those involved in forest planning and to make sure silviculture in Québec is tailored to the ecology of the sites and to the various management objectives set. They also set out choices of scenarios or possible treatment sequences for the management strategy to result in wood production, in accordance with the sites' production capacity and management constraints (windfall risk, vulnerability to insects and diseases, trafficability, and so on).

In Québec, natural regeneration is generally preferred. For sites that do not naturally regenerate with desirable species within a reasonable time, reforestation with native species is recommended.

Lastly, it is important to be aware that phytocides are banned in all forest management units.

[58] http://www.mffp.gouv.qc.ca/forets/connaissances/connaissances-guide-sylvicole.jsp.

7.3 Wood production strategy

To help draw up wood production strategies, the ministerial guidelines for creating wealth from wood are as follows:

1. Target economic profitability for forest investments
2. Offer a variety of management options to boost the long-term sustainability of the strategy
3. Prioritize tried-and-true methods

These guidelines are associated with various objectives, such as:

- Implementation of silvicultural scenarios indicative of the highest economic profitability
- Optimal use of the silvicultural budget
- Sustainable economic profitability
- Allocation of silvicultural expenditure based on risk level

Economic analyses are carried out to ensure that the management strategy will make it possible to achieve these objectives. Silvicultural and management choices are thus influenced by objectives associated with the wood production strategy.

As part of the creation of the regional strategy, specific wood production objectives are defined taking the following three issues into account.

Wood production issues and objectives

Issues	**Objectives**
Creation of value and forest volumes	• Maintain or increase production of targeted species • Increase average volume per tree • Increase production of high-quality timber • Rebuild forest resources in damaged and depleted forests
Forest composition	• Maintain pure softwood stands at adapted sites • Increase the proportion of spruce compared to fir • Increase the proportion of yellow birch in the mineralized SUM zone • Reduce the proportion of American beech trees in tolerant hardwood stands* • Reduce the proportion of red maple in tolerant hardwood stands and stands of tolerant hardwoods/softwoods

Forest health	• Reduce the emerald ash borer risk • Reduce the American beech bark disease risk*

** Issues relating to American beech*

- *Increase in the proportion of beech compared to other species in the understory of hardwood forests where the majority of trees are sugar maples.*

Selection cutting in stands where most trees are sugar maples has historically had the effect of leaving a significant proportion of low-quality beech standing. As a result, this species, which still today is of little value in the industry, is often overrepresented in tolerant hardwood forests. In many sugar maple stands, regeneration in the understory is dominated by beech trees to the detriment of sugar maple.

- *Difficulty in managing AMB sustainably*

Although AMB trees benefit wildlife, they can no longer be used to produce high-value logs due to bark disease. The few trees that are resistant to the disease are hard to identify.

7.4 Improving the economic profitability of forest investments

MFFP's expenditure on forests targets regeneration and maintaining or improving forest output in order to achieve the best possible financial return. Forest planers have access to tools and economic and financial assessment processes to help them choose the silvicultural scenarios that best meet the economic objectives while taking the environmental and social objectives into account. The purpose of these tools and processes is to facilitate decision making in drawing up the best management strategy in terms of economic spinoffs for society as a whole.

7.5 Local and regional objectives

7.5.1 Issues identified by TRGIRTO

The aim of the panel's discussions is for MFFP to take into account, throughout the entire planning process, conservation and development issues relating to all forest resources and functions identified by agreement among the TRGIRTO members. The panel defines the local and regional objectives for sustainable forest management and makes a recommendation to MFFP for them to be included in IFMPs. MFFP then studies the panel's recommendations and decides which ones to include in the IFMPs. This approach results in more benefits and spinoffs for communities, thanks to a mutual understanding of the respective interests of all stakeholders in the same area.

The issues identified by TRGIRTO are set out in the table below.

Table 8. Issues recommended by TRGIRTO

Topics	Issues
Ecosystem-based management	Forest age structure
	Spatial organization
	Plant composition
	Internal structure and dead wood
	Wetlands and riparian environments
	Threatened or vulnerable species
	Protection for wildlife sites of interest
	Effects on forest soil
Special wildlife habitats	Furbearer habitats
	Moose habitats
	Fish habitats
	Small game habitats
	Deer yards
Forest landscapes*	Landscape quality in forest environments
Coexistence of all users	Quality of the forest experience
	Boundaries of structured wildlife areas
	Hunting experience
Wood supply	Supply in terms of volume and quality
	Supply costs
Workers and local communities	Creation and distribution of wealth for the benefit of communities and forest workers
Roads**	Access to natural resources via a strategic and sustainable road network
Climate change	Effects of climate change

* *Issue relating to the quality of the landscape*

Preserving the visual quality of landscapes is one of the main concerns voiced by local residents and by many forest users. Forestry operations affect the quality of landscapes on two levels. Firstly, they have a social impact when they mar the visual quality of the landscapes valued by local residents, because these landscapes are where residents live. Secondly, these operations have an economic impact because, for many sectors of the forest recreation and tourism industries, the quality of the product and experience are based on the beauty of the forest landscapes. Although users have a generally negative perception of forestry operations, it has been found that they can accept various degrees of alteration depending on the sensitivity of the landscape in question. Cutting is therefore possible as long as it blends into the landscape and is consistent with the sensitivity of the area.

** *Issue relating to the road network*

A 2012 study on the state of the road network showed that 94% of roads were Class 4 (between 5.5 m and 7.5 m wide) or unclassified (narrower than 5.5 m). The state of the strategic network providing access to public land in Outaouais continues to deteriorate despite the occasional bridge construction project, the spending approved to allow for wood to transported, and some road improvement projects carried out by RCMs in the area. Closures and load limits for bridges also affect accessibility by road. The repercussions associated with the state of the road network are many and include the risk of accidents, lack of access to resources, significant drop in economic benefits due to a stoppage or slowdown in operations, as well as a curb on the development of other activities associated with the resources and the land.

This issue affects all users, and TRGIRTO is currently assessing certain possible solutions.

7.5.2 Industrial issues

In March 2013 MFFP and the Québec Forest Industry Council (QFIC) reached an initial agreement[59] on the distribution of roles and responsibilities for certain forest planning activities. The main purpose of the agreement was to allow the industry to continue to seek forest certification and optimize the planning of harvest operations. When reviewing the agreement, QFIC made MFFP aware of the importance QFIC attaches to the consideration of economic issues in the forest planning process and to the need for these processes to include economic indicators and targets. By signing the agreement, MFFP acknowledged the need to include indicators and targets for economic and financial profitability in forest planning and to work with the industry, through joint committees, to establish targets to be met.

7.5.3 Issue relating to volume management

Operational planning that generates the volumes granted, in accordance with the management strategy targets and with the regional issues identified by TRGIRTO, sometimes results in circumstances that make it difficult for holders of rights to harvest these volumes under normal financial conditions. This leads to a discrepancy between the needs of rights holders and the forest's capacity to meet these needs over the long term.

[59] MFFP and QFIC (2013).

PART 4: INTEGRATED FOREST MANAGEMENT STRATEGY

8. Forest management strategy

The forest management strategy reflects all the solutions selected to best address the various forest management issues discussed in the preceding chapter.

First, steps were taken to identify the aspects of the management strategy that address the issues raised by TRGIRTO as well as the other regional issues. The results are presented in the table below.

Table 9. Issues raised by TRGIRTO as well as other regional issues and selected solutions

Theme	Issue	Solution
Ecosystem-based management	Forest age structure	- Indicators and targets - Age structure (Section 8.1)
	Spatial organization	- Issue related to the spatial organization of forests (Section 7.1.2)
	Plant composition	- Indicators and targets - Increasingly rare species (Section 8.1) - Wood production strategy (Section 8.2) - Special beech recovery plan (Section 8.2.3.3) - Silvicultural strategy (Section 8.3)
	Internal structure and dead wood	- Indicators and targets - Internal structure and dead wood (Section 8.1) - Indicators and targets - Second-growth forests (Section 8.1)
	Wetlands and riparian environments	- Indicators and targets - Wetlands of interest (Section 8.1) - Indicator and target - Riparian environments (Section 8.1) - Requirements regarding wildlife sites of interest (Section 8.1.4)
	Threatened or vulnerable species	- Requirements regarding TVES (Section 8.1.3)
	Protection of wildlife sites of interest	- Requirements regarding wildlife sites of interest (Section 8.1.4)
	Effects on forest soils	- Included in the regulation (RADF) - Regional monitoring plan (RMP)
Special wildlife habitats	Furbearer habitat	- Handled indirectly using indicators and targets related to age structure, internal structure, and dead wood (Section 8.1) - Validation of management targets with sensitive species (Section 7.1.8)
	Moose habitat	- Discussions with TRGIRTO revealed that the real issue is the ambiance hunters are looking for.
	Fish habitat	- Procedures regarding wildlife sites of interest (Section 8.1.4) - Dates on which roadwork is prohibited in waterways based on species present - Limit the number of crossings and maximize use of existing roads (road construction cost strategy of those with timber supply guarantees)
	Small game habitat	- No particular measures requested by TRGIRTO - Indicators and targets - Second-growth forests (Section 8.1)
	Deer damage	- Requirements regarding white-tailed deer yards (Section 8.1.2)
Forest landscapes	Quality of forest landscapes	- Sensitive sites are classified, and the requirements are based on the degree of sensitivity according to the method discussed with TRGIRTO (Section 8.1.5) - Concepts of visual frames included in the regulation (RADF)
Cohabitation by all users	Quality of the forest experience	- Schedule of operations included in the harmonization measures. - Operational harmonization - Discussions underway with TRGIRTO

Theme	Issue	Solution
	Boundaries of structured wildlife areas (SWA)	- In all forest management units except FMU 072-51: When a regeneration cut requiring a forest strip overlaps the boundaries of a structured wildlife area, the boundary is used to insert the cut separator - When this is impossible for operational reasons, the SWA manager concerned must be contacted - Limit new entries into structured wildlife areas
	Hunter ambiance	- Under discussion with TRGIRTO
Timber supply	Volume and quality supply	- Wood production strategy (Section 8.2) - Financial indicators (Section 8.1.6)
	Supply costs	- Financial indicators (Section 8.1.6)
Local communities and workers	Creation and sharing of wealth for the benefit of communities and forestry workers	- Under discussion with TRGIRTO
Road network	Access to natural resources by a sustainable strategic road network	- Action plan being developed by TRGIRTO - Under discussion with TRGIRTO
Climate change	Climate change	- Management strategy (Section 8.4)

8.1 Indicators and targets to ecological issues

The following table presents the indicators and targets selected for all the ecological issues discussed in sections 7.1.1 to 7.1.7 (except 7.1.2 - Spatial organization). As has already been mentioned, anyone who submits a request to the MFFP can obtain VOITC files, which outline the situation according to set targets and specify the terms for monitoring indicators.

Table 10. VOIT summary

Value (issue)	Objective	Indicators for 2018–2023	Targets for 2018–2023
Forest age structure (growing scarcity of old forest stands and overabundance of regenerating stands)	Ensure that the age structure of managed forests resembles that of natural forests.	Percentage of the area with a low to moderate level of alteration in forest age structure compared to reference states (per FMU)	For the “old” stage: - The sum of the area of territorial units of analysis (TUA) with a low alteration level must represent at least 50% of each FMU; - The sum of the area of territorial units of analysis (TUA) with a high level of alteration level must represent at most 15% of each FMU management unit. For the regeneration stage: - All the FMUs must be in the low level of alteration category
		Cumulative area (ha) of the regeneration cuts and partial cuts per TUA	Compliance with the regeneration cutting and partial cutting levels by TUA for each FMU
		Area (ha) covered by aging patches (per FMU)	5% of each FMU territory must comprise aging patches
		Ten-year profile of areas covered by old, structurally complex stands	Maintenance or expansion of areas of old, structurally complex stands for each FMU
Forest plant composition	Maintain or increase the proportion of increasingly rare or declining species g	Changes over ten years in areas with one or more increasingly rare species	In each FMU, maintain or expand areas containing one or more increasingly rare species
		Percentage of silvicultural prescriptions carried out in stands with one or more increasingly rare species in accordance with the regional silvicultural treatment chart.	In stands with one or more increasingly rare species, prescribe the treatments in the regional chart in 95% of cases
		Number of increasingly rare or declining species planted for all FMUs in the Outaouais Region	WHP: 1,000,000 plants/year (2018) and 500,000 plants/year (2019–2020) 250,000 plants/year (2020-2023) REP: 280,000 plants/year REO: 60,000 plants/year YEB: 30,000 plants/year
		Percentage of reforested areas (with at least one increasingly rare species planted) that undergo forest monitoring (according to the monitoring schedule for the current year)	Monitoring of 100% of reforested areas (containing at least one increasingly rare species planted) where monitoring is scheduled
Internal structure of forest stands and dead wood	Increase number of biological legacies in regeneration cuts	Proportion of clear cut areas (ha) under variable retention harvesting (VRH) where solutions to retain at least 5% of the commercial volume (per FMU) are used	At least 20% of variable retention cuts should retain at least 5% of the commercial volume Ideally, use retention methods on large cut areas

Value (issue)	Objective	Indicators for 2018–2023	Targets for 2018–2023
	Maintain characteristics of complex structure in partially cut stands	Residual basal area (m^2/ha) of "D" and "S" trees[60]	Maintain at least 1 m^2/ha of "M" ad "S" category trees of large diameter (if possible DHB of > 40 cm [61]) in partial cut areas.
Simplification and homogenization of second-growth forests	Reduce the difference between the current forest and the natural forest by preventing the disappearance of complex structures through their simplification	Proportion of productive forest area tended during regeneration and sapling stages	Treat not more than 50% of productive forest areas in the regeneration and sapling stage in a TRU[62].
		Proportion of the area left intact during tending	Keep 10% of each treated block of over 40 ha intact
Wetlands	Grant increased protection to a group of sites specifically targeted according to various ecological criteria	Proportion of wetlands in the reference area (per FMU)	Protect a surface area equivalent to17% of wetlands in the reference territory by FMU
		Proportion of wetlands of interest that are protected	Protect 100% of listed wetlands of interest
Riparian environments	Keep a representative sample of the riparian environment	Area of annually harvested forest strips excluded from forest management	No harvesting in forest strips excluded from forest management

Details on indicators and targets:
Age structure issue: The status indicator is used to track changes in a given ecological characteristic, namely old, structurally complex stands.The objective can be reached using the solutions put in place for the action indicators.
Issue related to plant composition: The quantity of white pine that will be planted will be reduced due to the strong presence of blister rust.
Issue related to second-growth forests: The indicators and targets are designed to conserve naturally regenerated dense sapling stands and distribute the treated areas in space. Meeting these objectives will allow second-growth forests to help conserve biodiversity.
Issue related to wetlands: As a minimum, the region decided to protect a surface area equivalent to 17% of wetlands per FMU, in line with the government's commitment to raise the total protected area to 17% by 2020.
Issue related to riparian environments: The protection and development objective regarding the preservation of dead wood in managed forests (PDO 8) has been renewed for which 20% of the total surface areas of the riparian wooded edge measuring 20 meters in width was inventoried and subtracted from forest development in each FMU. Representation is based on the forest composition of all the edges.[63]

[60] Quality of trees according to the MSCR classification: "M"(moribund) for trees that will die in less than 20 years; "S" (surviving) for trees that will likely deteriorate but will survive for at least 20 years.
[61] Diameter at breast height
[62] Territorial reference unit
[63] Dery and Labbé (2006).

8.1.1 Additional measures – Increasingly rare species

In addition to the objectives and targets regarding the above ecological issues, other guidelines have been developed to address the increasing scarcity of butternut, black ash, and eastern white cedar.

Butternut

Because of their status, healthy butternut trees are neither identified by marks or cuts during forest management operations. In addition to keeping the trees healthy, the forest cover can be open in order to promote regeneration. However, butternut trunks with cankers or with over 50% canopy death must be cut. It is also recommended to eliminate infected tissue to reduce propagation of the disease.

Black ash

Black ash is found in wetlands, where logging is virtually nonexistent: black ash/balsam stands are not targeted for harvesting. No reforestation is done for this species because of the aggressive nature of the emerald ash borer. The selected measure is designed to protect MF18 ecological type (black ash/balsam stand on organic soil, hydric drainage, minerotrophic conditions, presence of eastern white cedar)

Eastern white cedar

Currently, eastern white cedar stands on RC38 ecological type (sphagnum moss/cedar stand on organic soil with hydric, minerotrophic conditions) have been excluded from permitted harvesting zones. In white-tail deer confinement areas, cedar, which is renowned for providing good quality shelter, is not harvested.

8.1.2 Measures applicable to white-tailed deer yards

8.1.2.1 White-tailed deer yard management plans

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

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

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

8.1.2.2 Small deer yards

For small white-tailed deer yards on public land that are not included in a management plan, the *Regulation respecting standards of forest management for forests in the domain of the State* (RSM) (or RADF) is applied using a characterization of white-tailed deer yards based on the interpretive key in the deer damage guide: "*Guide d'aménagement des ravages de cerfs de Virginie"* and a brief deficiency analysis of shelter and food/shelter stands. The selected silvicultural treatments are aimed at meeting regional objectives regarding shelter and food/shelter stands.

8.1.2.3 Peripheral portions of white-tailed deer yards

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

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

8.1.3 Measures applicable to threatened and vulnerable species

Legal clauses

Protection measures apply under the:

- Act respecting threatened or vulnerable species and the Regulation respecting threatened or vulnerable plant species and their habitats;
- Act respecting the conservation and development of wildlife and the Regulation respecting threatened or vulnerable wildlife species and their habitats;
- Sustainable Forest Development Act in exceptional forest ecosystems, including shelter forests for threatened or vulnerable plant species.

The habitats of threatened or vulnerable species designated by these laws and regulations are called “designated habitats”.

Guidelines

Threatened or vulnerable species in public forests where forestry operations are carried out do not legally benefit from the “designated habitats” designation are protected by an administrative agreement between the MFFP and the ministère du Développement durable, de l’Environnement et de la Lutte contre les changements climatiques (MDDELCC). Comprehensive protection measures and special methods permitted under certain conditions are stipulated in this administrative agreement on the protection of threatened or vulnerable forest species. These terms apply to forest users and are taken into consideration during forest planning initiatives.

All new observations on the threatened or vulnerable species are stored with interim regional data, and provisional protection applies pending their integration into the official data.

When threatened and vulnerable species that do not currently benefit from special measures are present in the area, temporary measures are applied. Known, confirmed forest sites for threatened or vulnerable species are included in the forest management plan, and established protection measures must be taken during logging. Protection measures take the species’s habitat and life cycle into account. These sites must be kept confidential as much as possible to prevent overharvesting.

The general measure permitting the full protection of threatened or vulnerable plants is the full ban on forest development operations in their habitats. Wild leek is an exception since special measures have been developed for this species. The eco-forest polygon is considered when outlining the habitat of a threatened or vulnerable species.

For more information about these protection measures, please consult the link below: http://www.mffp.gouv.qc.ca/publications/enligne/forets/criteres-indicateurs/1/121/Flore/mesures_protection.asp

With respect to the protection measures for threatened or vulnerable wildlife species, an intensive protection zone and/or a buffer zone is implemented, where certain activities may be permitted under select conditions. For more information about these protection measures, please consult the link below: https://www.mffp.gouv.qc.ca/faune/especes/menacees/conservation.jsp#mesures

8.1.4 Measures for wildlife sites of interest

Protection requirements for wildlife sites of interest are incorporated into forest practices and taken into account in the forest planning process. Those developed for the Outaouais region are presented in Appendix C. Requirements for wildlife sites of interest in the portions of FMU 073-52 and FMU 074-51 that overlap the Abitibi administrative region were developed specifically for that region.

8.1.5 Requirements regarding forest landscape quality

A methodology has been developed for assessing landscape sensitivity in various sites of interest in Outaouais. The proposed methodology is a regional adaptation of the decision-making tool created by Pâquet and Deschênes.[64] The methodology takes into account the interests of all stakeholders as objectively as possible. An effort was also made to base the methodology on the most current data from all organizations. Each site submitted by TRGIRTO members representing the various stakeholders were classified using this methodology. The requirements were developed and proposed by TRGIRTO members and applied by MFFP in the forest planning process. Protection levels are assigned to sites based on their level of sensitivity.

[64] Paquet and Deschenes (2005).

8.1.6 Financial indicators

To address industry issues, the operational tables have developed indicators directly or indirectly expressing the economic and financial profitability of the forestry plan. They enable MFFP and the forestry industry to factor provincial and regional economic issues into the forest plan. The indicators are monitoring tools used in implementing a profitable and sustainable forest plan.

8.1.7 Operational characterization of allowable cut

Concrete measures have been targeted at different stages in the forest planning process to ensure better harmonization between the various parts of the process and improve volume management. Some of these measures are slated to be implemented in 2018-2023. Volumes subject to extreme conditions will be quantified and communicated to rights holders, and these conditions will be taken into account throughout the volume management process.

8.2. Regional wood production strategy

CHALLENGE: "*ENSURE PRODUCTIVE FORESTS THAT GENERATE WEALTH AT DIFFERENT LEVELS*"
PRIORITY: *Strive to increase added value from wood sources to generate greater collective wealth.*
- Sustainable Forest Management Strategy

The main function of a wood production strategy is to promote better decision making regarding silvicultural investments to maximize wealth creation from wood resources. These investment decisions must consider industry needs, other uses and functions of the forest, and sustainable forest management principles[65].

Here are the three priorities that underpin the management choices and silvicultural operations used to generate wealth from wood: 1) Promote the economic profitability of silvicultural investments, 2) ensure optimal diversity to increase the long-term robustness of the strategy, and 3) focus on the most profitable options

The aspects pertaining to the regional wood production strategy in this TIFMP are the selected "desirable" species, production goals, silvicultural methods, and economic analyses of these methods. Intensive management areas and concrete examples of actions to increase wood production are also covered in this section.

[65] MFFP (2016b).

8.2.1 Desirable species

Determining desirable species is an important step in developing wood production strategies because it makes it possible to target the most profitable species. Desirable species were selected by conducting an overall assessment of the species found in the region based on the following criteria:

1. Availability of each species (volume of standing timber, history of allowable cuts, allocations and timber supply guarantees
2. Area of high biophysical potential for each species
3. Demand and industrial consumption (saw mill and harvesting needs)
4. Vulnerability to risks associated with climate change, browsing, insects, and disease
5. Value of products associated with each species
6. Effort and management success rate of each species

The other species have been divided into three categories: species to promote, acceptable species, and species that must be controlled[66]. It should be noted that the same species may be put into more than one category, depending on the specific site or management goals.

Desirable species, desirable species to promote, acceptable species, and species to control

Sugar maple (SUM) *Yellow birch (YEB)* *Red oak (REO)* *White spruce (WHS)* *Black spruce (BLS)*	**Desirable species** Based on the above criteria, these species rank the highest. Production goals for them have been identified and production efforts will be aimed at increasing yield.
Eastern white cedar (EWC) *White pine (WHP)* *Red pine (REP)* *Poplars (POP)*	**Species to promote** These are species for which silvicultural treatments should be used to increase their numbers in stands. Silvicultural scenarios can be extensive, basic, intensive, or elite.

[66] A French-language forestry glossary is available at: http://glossaire-forestier.mffp.gouv.qc.ca/

Balsam fir (BAF) *Paper birch (PAB)* *Jack pine (JAP)* *Ash (ASH)* *Other noble hardwoods[67] (ONH)* *American larch (AML)* *Eastern hemlock (HEM)*	**Acceptable species** In a given stand or at a given site, "acceptable" species will receive no silvicultural treatments to decrease their numbers because they do not hamper optimal growth of species that we want to promote. Extensive or basic silvicultural scenarios are mainly used for these species.
American beech (AMB) *Red maple (REM)*	**Species to control** These are species for which silvicultural treatments should be used to decrease their numbers in stands. There are no production goals for these species.

8.2.2 Wood production goals and silvicultural options

Production goals are established to help address the issues presented in Section 7.1.3. in the previous chapter. Each objective applies specifically to one or more desirable species. These species are promoted by taking concrete measures set out in the silvicultural scenarios. The table below presents the production goals, their respective desirable species, and the selected silvicultural options. These options are an integral part of the silvicultural strategy presented in Section 8.3.

[67] Other noble hardwoods: hickory, black cherry, elm, ironwood, Butternut, oak, and basswood

Table 11. Wood production goals

Objective	Desirable species	Silvicultural Option
Maintain or increase production of targeted species	BLS, WHS	- Commercial cuts (natural regeneration)
		- Tending (natural regeneration)
		- Planting, reforestation, and fill planting scenarios
	SUM, YEB, REO	- Shelterwood cutting and selection cutting
		- Regeneration tending
Increase volume per tree	BLS, WHS	- Intensive planting scenarios
Increase quality hardwood lumber production	BLS, WHS	- Intensive planting scenarios
	SUM, YEB, REO	- Shelterwood cutting and selection cutting
		- Precommercial and commercial thinning, pruning to improve quality
Rebuild forest capital	SUM, YEB, REO	- Shelterwood and regeneration cutting of impoverished and degraded forests
		- Regeneration tending
		- Fill planting scenarios
	WHS	- Basic refilling and intensive planting scenarios
Increase the proportion of spruce to balsam	BLS, WHS	- Extensive commercial cuts (natural regeneration) - Tending (natural regeneration) - Planting, reforestation, and fill planting scenarios
Maintain pure softwood stands on sites with good potential for the species	BLS, WHS	- Extensive commercial cuts (natural regeneration) - Tending (natural regeneration) - Planting, reforestation, and fill planting scenarios
Increase the proportion of yellow birch in the mineralized maple zone	YEB	- Shelterwood cuts, seed cutting
		- Fill planting scenarios
Reduce the proportion of American beech in tolerant hardwood stands and reduce the risk of bark disease	SUM, YEB, REO	- Shelterwood cuts, seed cutting - AMB control
Reduce the proportion of red maple in tolerant hardwood stands and softwood-tolerant hardwoods	SUM, YEB, REO	- Shelterwood and regeneration cutting - Regeneration tending - Fill planting scenarios
	WHS	- Basic refilling and intensive planting scenarios
Reduce risk of SBE	WHS	- Commercial cuts (natural regeneration) - Tending (natural regeneration) - Planting, reforestation, and fill planting scenarios

8.2.3 Implementing the wood production strategy

Although the regional wood production strategy has not yet been finalized, a number of strategic management measures in the existing TIFMP are designed to meet these goals. Below are a few examples.

8.2.3.1 Promotion of desirable species

Concrete measures are taken or planned to promote desirable species, including:

- annual planting of spruce, yellow birch, and red oak
- Tailoring tending specifications to promote spruce over balsam
- Using a map delimiting a mineralized maple zone
- Pruning YEB and REO to improve their quality

8.2.3.2 Economic maturity diameter

To produce high quality cuts, the concept of financially mature diameters makes it possible to distinguish, on a financial level, mature trees from those with the potential to increase their value during the next rotation. Direction de la recherche forestière published a research note in 2016 for sugar maple and yellow birch[68]. Accordingly, strong, good-quality sugar maple and yellow birch are deemed financially mature for timber production when they reach a diameter of between 43 and 47 cm depending on species, geographic location, and anticipated rotation duration. At this diameter, the stems in a stand have reached their maximum financial value and losses in value due to their deterioration or death will not be offset by their continued growth. This concept is relatively new and is in line with sylvicultural stand diagnosis during the analysis of lumber production for partial cuts in hardwood stands.

High value lumber production will be integrated into the lumber production strategy presently under development. For partial cuts, when the stand characteristics (regeneration, saw timber, small and medium-sized logs) allow for sustained high-value lumber production, the harvest of all or some of the stems that have reached their financial maturity diameter may be considered. The partial cut must however be carried out in such a way as to achieve a targeted structure, composition, quality and regeneration, which in turn will determine performance during rotation and over the long term.

[68] Guillemette (2016)

Recommendations on this subject are issued by Comité sur l'impact des modalités opérationnelles des traitements en forêt feuillue (CIMOTFF).[69]

8.2.3.3 Strategy for American beech

A management strategy for American beech has been underway since 2014 under a special recovery plan to prevent beech saplings from taking over the undergrowth and to recover trees infected or likely to be infected with American beech bark disease. This strategy will be incorporated into the 2023-2028 tactical plan. In the meantime, an updated version of the special plan will cover the period from 2018 to 2023 (see Section 8.3.2.2.).

8.2.3.4 Definition of a mineralized maple zone

The silvicultural strategy in this zone is designed to promote yellow birch due to the low quality of the maple sugar trees (see Section 8.3.2.2).

8.2.3.5 Areas of increased timber production

Concept

One of the ways to increase the production of targeted species and quality hardwood is to set up areas of increased timber production (AITP). These zones should then be quantified and localized in the integrated forest management plan. An AITP is defined as

> "an area intended for timber production in which silvicultural practices are aimed at increasing value per unit area. Value can be increased by producing a greater volume per unit area or per tree, by boosting tree quality, producing desired species, or through a combination of these various production goals."

Generally speaking, areas selected for timber production should have a high growth potential and few operational constraints. Their location should also be subject to public consultations.

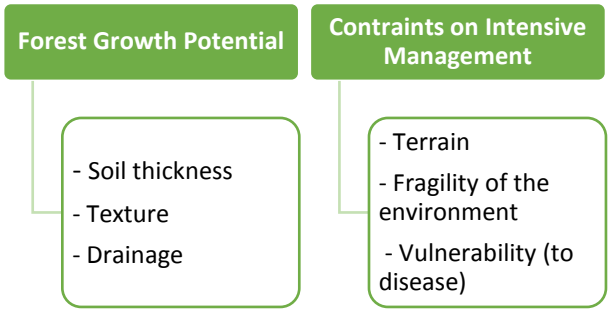
Given that forests in the region are mixed, an area may have even- and uneven-aged stands. Past practices will be considered if they produce the desired characteristics with good growth potential.

The first step is to determine this forestry potential. This step is discussed in the following paragraphs. Subsequent steps are presented in Appendix D.

[69] Saucier et al. (2014)

Mapping areas of high growth potential

The forests in the region's management units have good potential for increased timber production as they are the most productive in Québec. Therefore the first step is to identify the areas best suited to intensive silviculture, namely those with a higher than average growth potential and a low level of operational constraints.



A biophysical model has been developed for mapping forestry potential. The model is based on site-specific characteristics (i.e., growth potential and constraints on intensive production). The result is a rough map presenting forestry potential at the forest polygon scale.

Areas excluded from forest management and certain hands-off management methods are not included on the map. Figures 12 to 17 show the results by forest management unit.

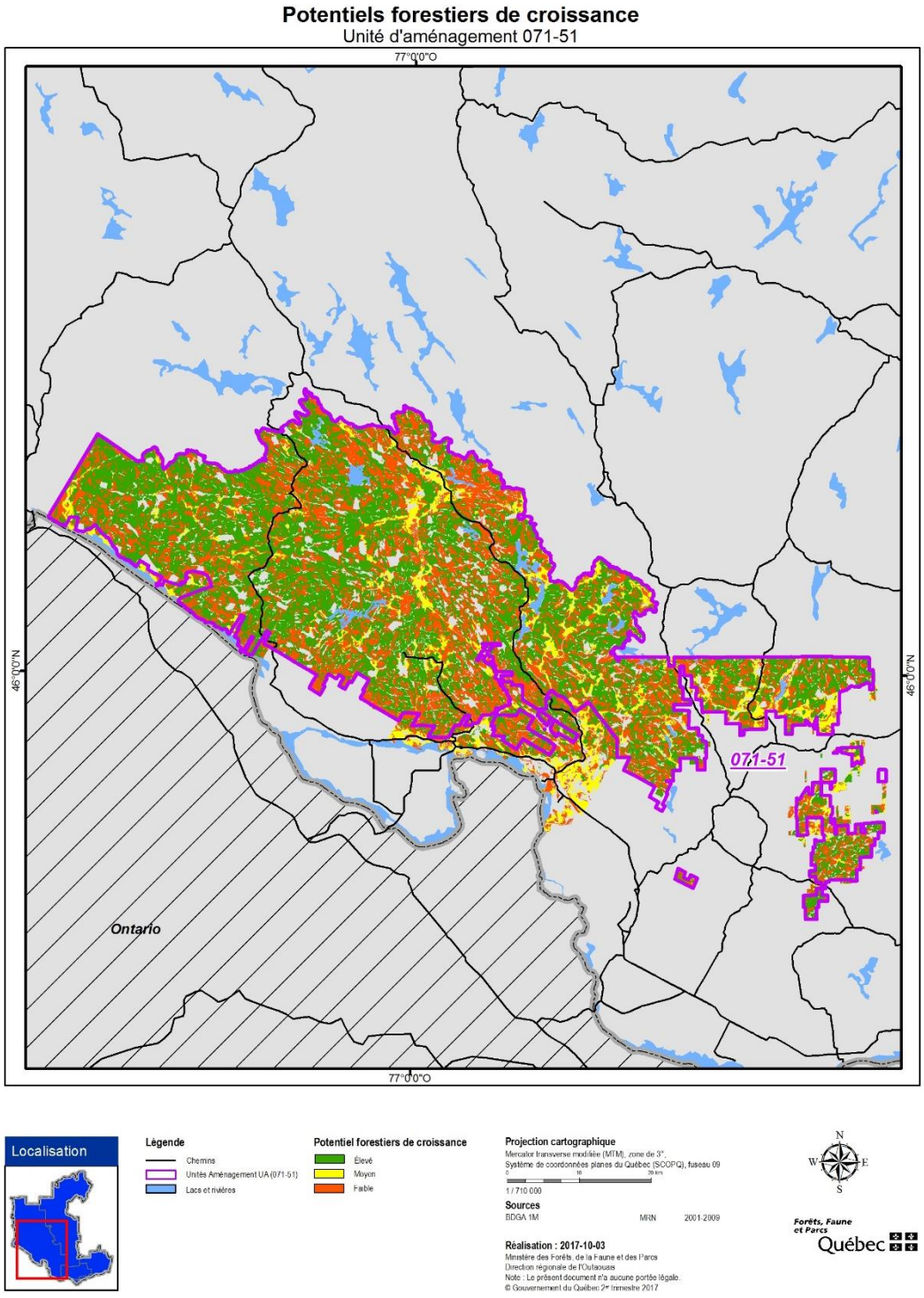


Figure 12. Classification of forest polygons based on growth potential – FMU 071-51

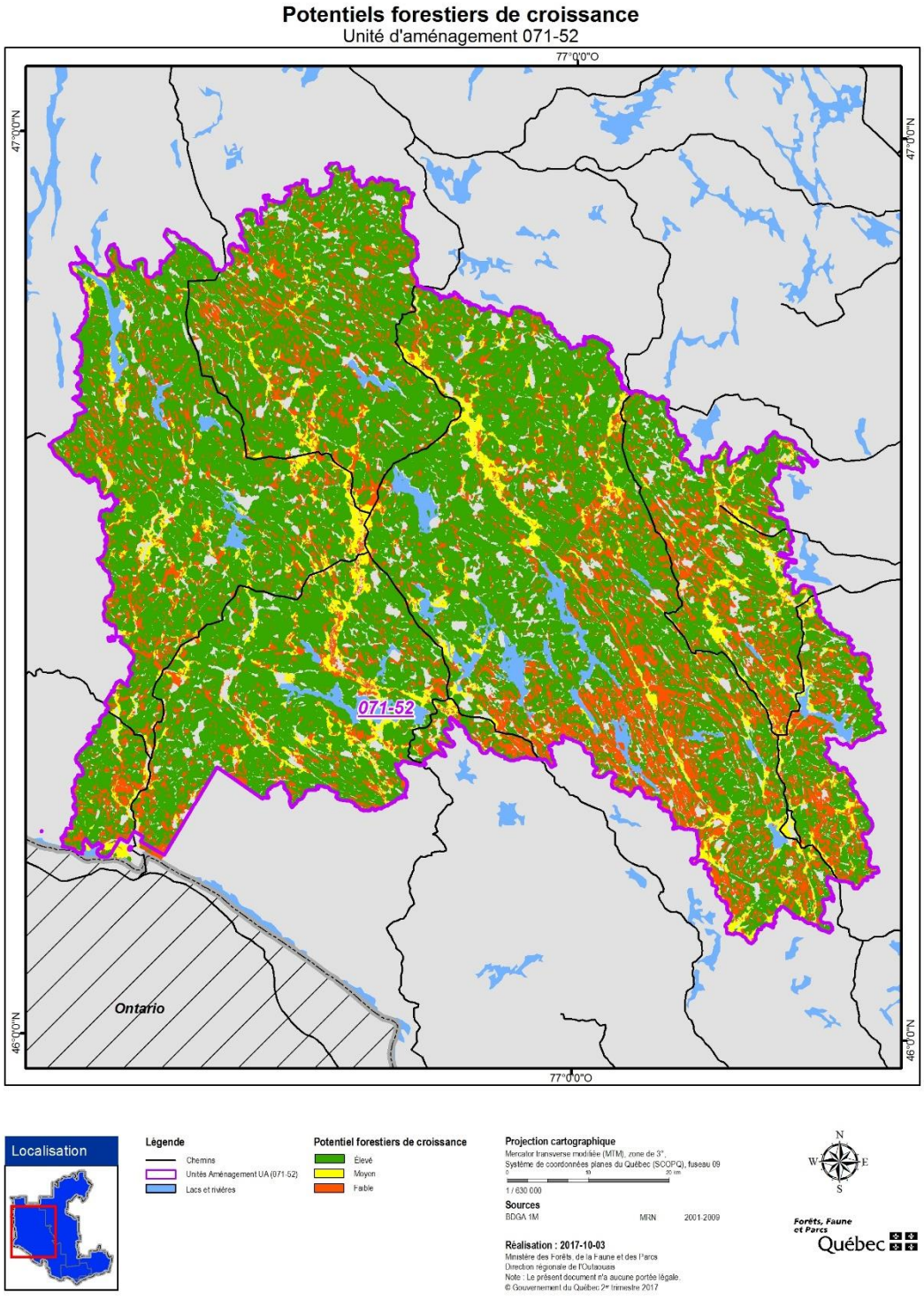


Figure 13. Classification of forest polygons based on growth potential – FMU 071-52

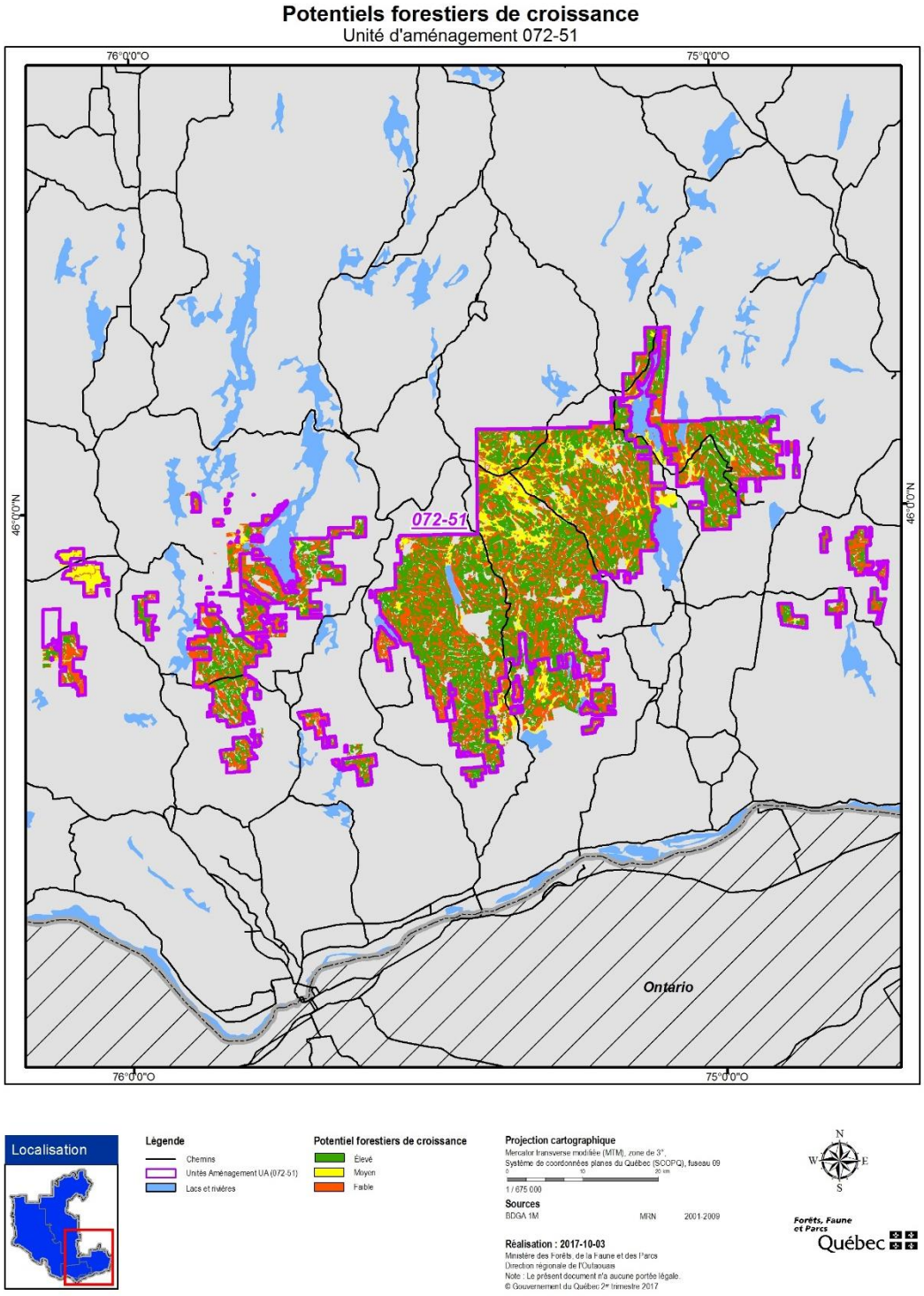


Figure 14. Classification of forest polygons based on growth potential – FMU 072-51

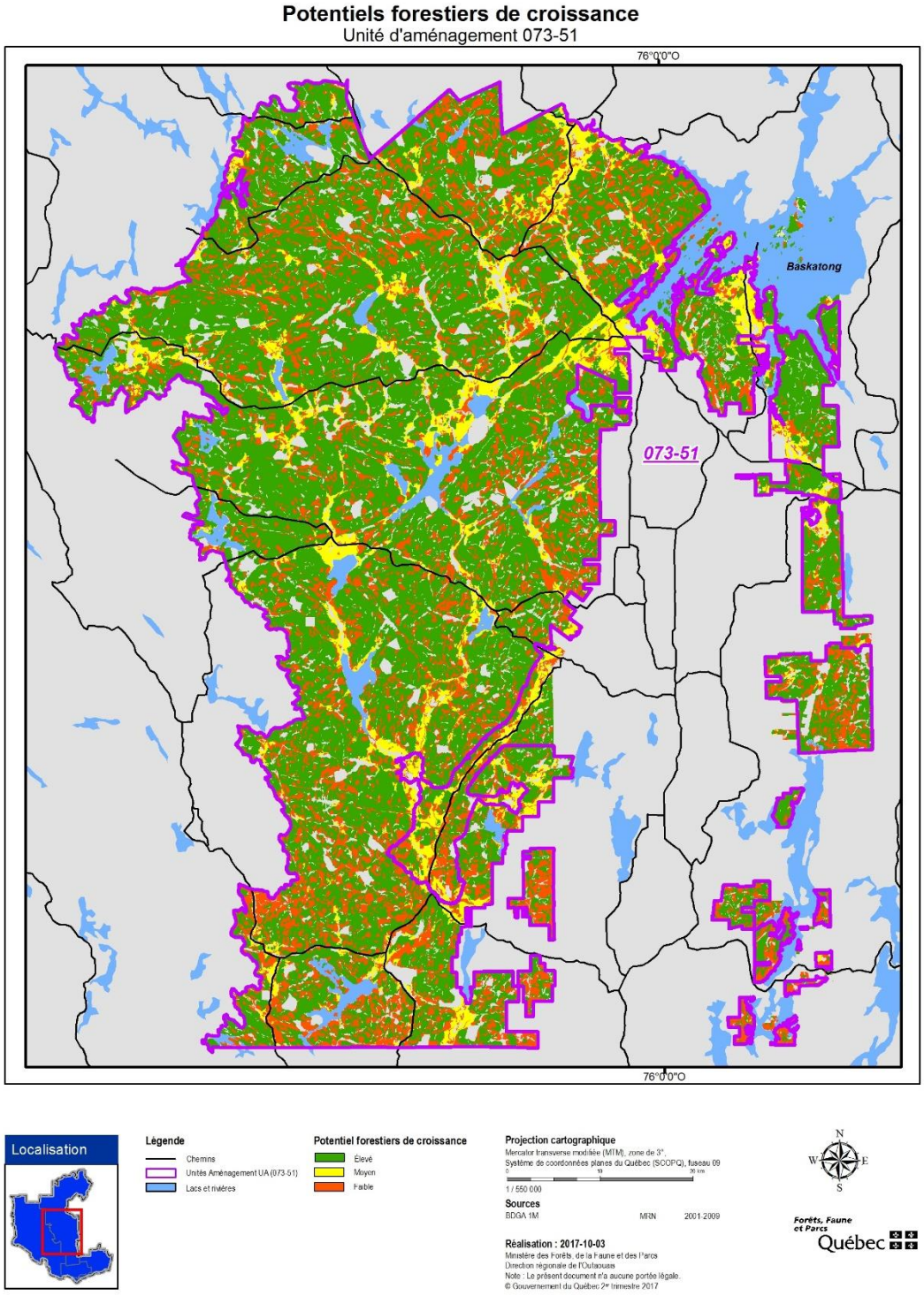


Figure 15. Classification of forest polygons based on growth potential – FMU 073-51

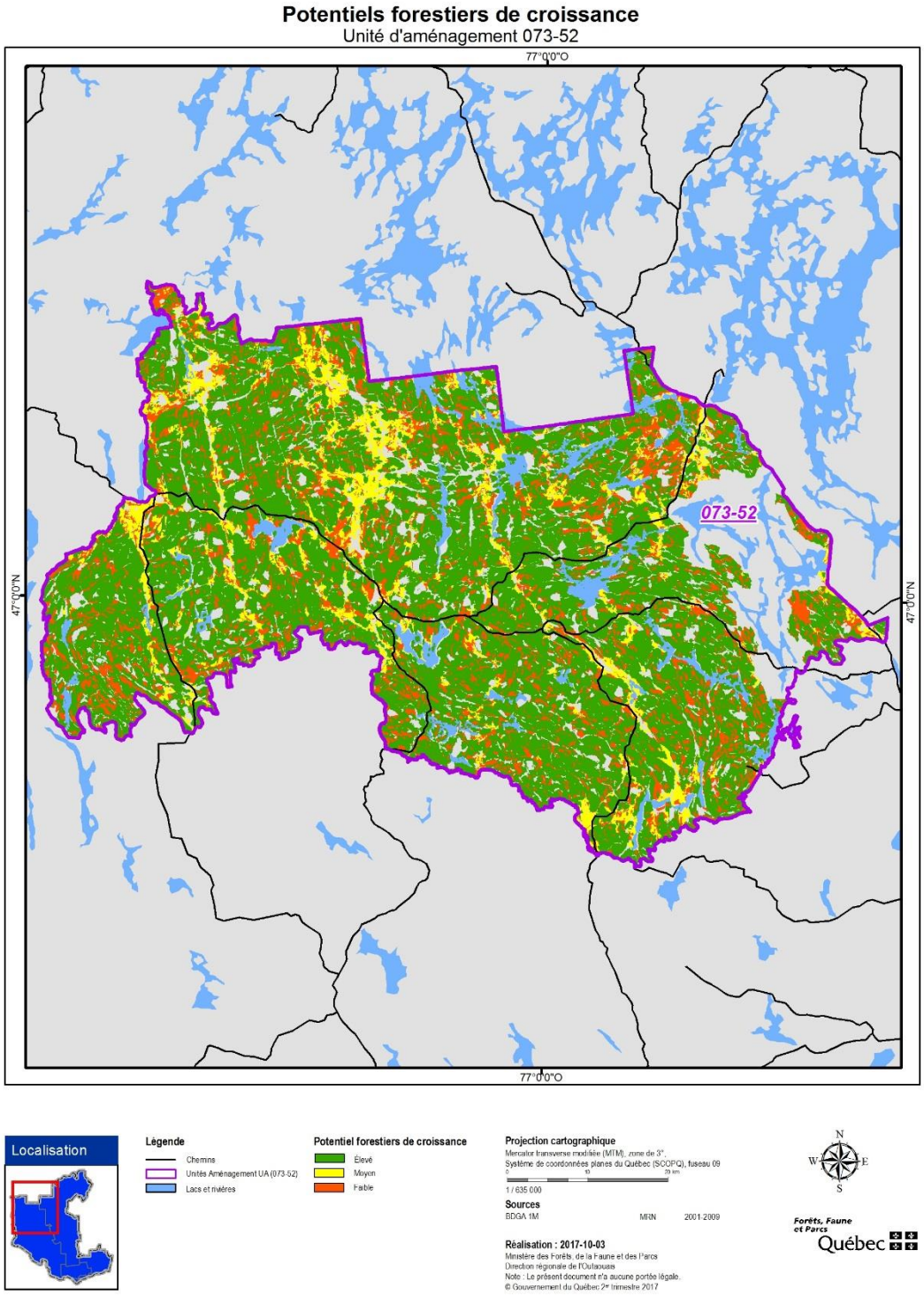


Figure 16. Classification of forest polygons based on growth potential – FMU 073-52

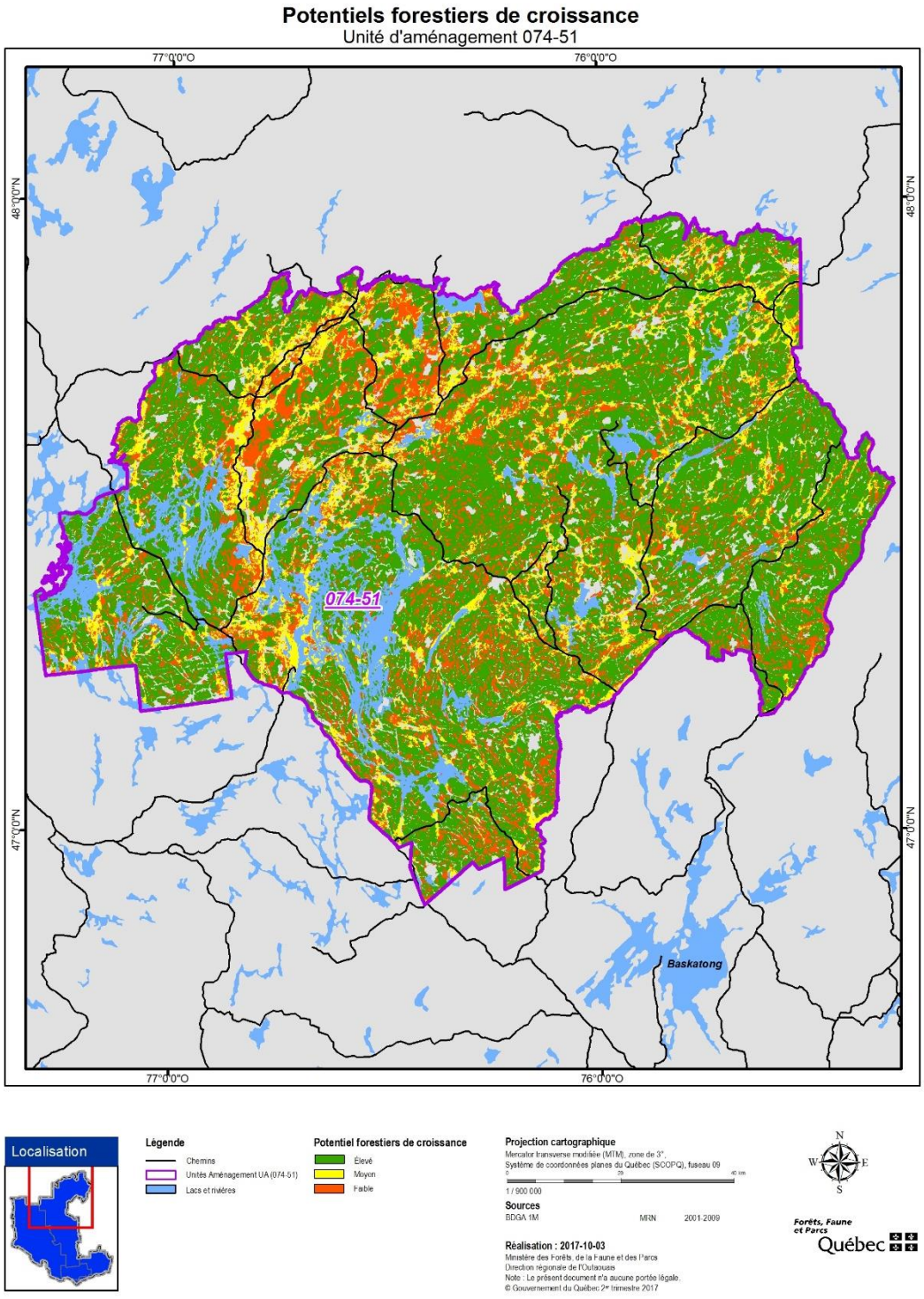


Figure 17. Classification of forest polygons based on growth potential – FMU 074-51

8.2.4 Economic analyses

The purpose of an economic profitability analysis is to measure the economic profitability of an investment to society. The revenues and costs of all economic agents are taken into account, without considering who pays and who receives. The analysis aims to measure the level of wellbeing or total wealth an investment creates for society. Accordingly, the economic benefits to consider come from the production and processing of ligneous material and non-commercial sylviculture.

The economic benefits from other forest resources and uses (wildlife, vegetation, recreation/tourism activities, etc.), and environmental considerations (e.g., carbon sequestration), although addressed from a qualitative perspective, have not yet been quantified and directly included in the economic profitability analysis.

Preliminary analyses were conducted on the various silvicultural scenarios in the silvicultural strategy presented in Section 8.3 (See Appendix E for more information on the analysis conducted as part of the TIFMP). The investments are the amounts allocated for commercial and noncommercial silvicultural work.

The unit of measurement used in these preliminary analyses is "**gross economic value**," or the ratio between the net present value of the investment in perpetuity over the discounted costs incurred in perpetuity. It is expressed by the following formula:

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

Where $\mathbf{GEV_p}$**:** Discounted revenues in perpetuity – discounted costs in perpetuity
$\mathbf{C_p}$ **:** Discounted costs in perpetuity

This measurement provides a common yardstick for comparing different scenarios. It is then possible to:

- Compare different scenarios within the same strata group
- Compare the same scenario in different strata groups
- Compare all the results at the FMU or regional scale

The silvicultural investment assessment model (MERIS) available on the website of MFFP's Bureau de mise en marché des bois (https://bmmb.gouv.qc.ca/analyses-economiques/outils-d-analyse/) was used for the economic analyses. It measures the economic benefits of producing and processing timber under the various silvicultural scenarios.

The analysis presented can be used to confirm whether use of the money generates a return on investment. Only scenarios requiring an investment are analyzed. Extensive

regeneration cutting with protection of regeneration and soils (with no investment) are not included in the results presented.

8.2.4.1 Results of the economic profitability analysis

The preliminary analyses show that a number of factors influence the results. The factor that appears to be the most important is the relationship between the level of investment and the value of the harvested products. Other factors, such as the rotation, period between operations, and potential vegetation, also affect the results.

The data in the tables below are qualitative and give an overall view of this preliminary exercise. The + and - categories are based on the amplitude of the values obtained at the regional scale. They are not necessarily comparable to the categories used in other regions.

Hardwood forest management (uneven-aged system)

The following table presents an overall assessment based on the results obtained according to the gross economic values of the main strata groups of tolerant hardwoods under an uneven-aged system.

Table 12. General variation in gross economic value (uneven-aged)[70]

Strata Group	Scenario[71]		
	SC	ISCSG	ISCPC
Yellow birch-softwood stands		+	+
Maple-yellow birch stands	+		+
Oak stands		+++	
Maple-other hardwood stands		++	++
Maple-low tolerance hardwood stands	++		++
Maple-tolerant hardwood stands		++++	
Maple-softwood stands		++	
Red maple-softwood stands		++	

These preliminary results are mainly positive. The strata groups with yellow birch have lower values. The additional cost of site preparation affects profitability in this scenario, but it can be used to orient the stand toward the desired future composition. The BFEC graphs do not reflect the growth potential of the yellow birch regeneration (sapling

[70] The analyses have not been completed for areas where the boxes are empty.

[71] SC: selection cutting; ISCPC: irregular shelterwood cutting with permanent cover; ISCSG: irregular shelterwood cutting with slow regeneration

recruitment) associated with the site preparation, and this significantly affects the findings of the economic analysis. The analysis revealed the following trends:

1. Better results were obtained in FMUs in the southern part of the region for the same combination of scenario and strata groups.
2. There appears to be an optimal harvesting eligibility threshold (initial basal area) for generating greater economic value.
3. The gross economic values calculated for hardwood forests, especially under selection cutting, are the highest of all the scenarios analyzed, in both softwood and hardwood strata.

Regular forest management (even-aged system)

The following table gives an overall view of the results of the economic analysis conducted on the main strata groups under the even-aged system. Yield in terms of future volume per planted species and silvicultural effort (maintenance work) required to obtain the expected yields greatly influence the results, but are generally positive.

The estimate of forest yield and years of work for reforestation and planting scenarios are taken from the plantation yield tables for white spruce (Table in Prégent et al. (2010)[72]), black spruce (Table in Prégent et al. (1996) - amended in 2013[73]), and jack pine (Table in Bolghari and Bertrand (1984)[74]).

Table 13. General variation in gross economic value (even-aged)[75]

Strata Group	Scenario		
	Fill Planting	Reforestation	Planting
White birch-softwood stands	-	+	+
Spruce-hardwood stands		++	+
Spruce-softwood stands		++	++
Balsam-white birch stands	-	+	+

The results indicate that the basic reforestation scenarios[76] generally rank highest, followed by intensive planting scenarios with commercial thinning[77]. Fill planting scenarios are the least productive given the investment required for yields comparable to those of a natural forest.

[72] Prégent et al. (2010).
[73] Prégent et al. (1996).
[74] Bolghari and Bertrand (1984).
[75] The analyses have not been completed for areas where the boxes are empty.
[76] Density is 1,600 trees per ha for reforestation.
[77] Density is 2,000 trees per ha for planting.

Although jack pine sites are poor, the values for this species were higher than for black or white spruce. These species require more tending because of the level of competition in such productive sites. Required maintenance work affects the ranking of the results according to the species planted.

Overall assessment

The initial findings revealed a series of factors influencing the results, including rotation extensions, time between operations, geographic location, and the choice of potential plants with varying levels of competitiveness and productivity. The factor that appears to be the most important is the ratio between the amount of required investment and the value of the products generated.

8.2.4.2 Implementation

Please note

This section presents the results of an initial economic profitability analysis. Due to the complexity of the procedure, we are able to present only preliminary results. The following warnings are important with regard to the scope and interpretation of these results and their analysis.

Data source	Graphs from BFEC were used in this analysis. The graphs were designed to assist in calculating allowable cut and not for economic analyses. Given the lack of alternatives, it was necessary to use these graphs. However, the consequences of their use have not been evaluated.
Issues raised	The results of the economic profitability analysis raise a number of issues about the: • Parameters used for certain silvicultural scenarios • Lack of effects on growth of certain silvicultural treatments • Absence of data on quality at the tree level in the inputs • Value of the wood by species • Assumption that all species and products can be sold and generate revenue These issues will be discussed further and included in an action plan in the near future. The results of this work may generate conclusions different from those presented in this section of the TIFMP.
Integration of the results	The results of this analysis did not affect the choice of silvicultural scenarios or treatments in the TIFMP covering the period 2018–2023.

It is important to remember that the results of the economic analyses presented in this TIFMP are based on the "**gross economic value**" of a management scenario. Gross economic value indicates whether the total yield of a scenario will be greater than the associated costs.

Subsequent analyses will measure the "**net economic profitability**" based on natural forest yield without investment (see Appendix E).

A provincial action plan is underway to improve and guide the approach used in economic analyses from now to 2020. Here are a few ideas on how to improve the method, the assumptions, and the interpretation of the results.

1. Review the parameters used in the silvicultural scenarios and calculation assumptions.
2. Evaluate and factor in the significant treatment effects that are not currently taken into account.
3. Incorporate the concept of tree quality using operational inventory data rather than growth curves.
4. Modify the MERIS tool to better manage product value and use rates.
5. Conduct sensitivity analyses.
6. Analyze the effects on allowable cut calculations.

More robust analyses will generate results allowing silvicultural strategies and management levels to be reviewed and adapted for use in future allowable cut calculations.

8.2.5 Indicators and targets associated with wood production issues

To develop regional production strategies, indicators and targets must be identified. They will take into account the needs and expectations of the various stakeholders in order to maximize the strategy's overall performance once implemented.

For this step, impact and sensitivity analyses must be conducted with the Chief Forester to clearly establish implementation rates for work aimed at addressing each wood production issue.

8.3 Silvicultural strategy

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

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

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

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

8.3.1 Silvicultural intensity gradient

The silvicultural intensity gradient ranks silvicultural scenarios and treatments based on required effort, including the number of operations needed to tend a forest stand or the level of silvicultural investments required. Silvicultural scenarios are thus evaluated according to the overall economic profitability of the operations and expected wood output. These assessments guide the decisions of the forest engineer.

The silvicultural intensity gradient is composed of four levels: **extensive**, **basic**, **intensive** and **elite**. The definitions in the box are from *Guide sylvicole du Québec*[78].

Silvicultural intensity gradient	
Extensive silviculture	Stand management is based on natural regeneration using cutting with protection of regeneration and soils, seed cutting, and cutting with protection of small merchantable trees. Advance regeneration is protected where regrowth establishment is assisted by natural seeding on good quality seedbeds created at harvesting or during site preparation.
Basic silviculture	Operations are aimed at managing stand composition i.e., interspecific competition. To increase the yield of desired species, competitor species are controlled through cleaning, tree release, and if required, artificial regeneration.
Intensive silviculture	Operations are aimed at increasing growth and improving the characteristics of selected trees of one or more species to be promoted. A series of operations spread out over time are used to select and encourage the best trees. Intensive silviculture also differs from basic

[78] MRN (2013).

	silviculture in that interspecific competition is managed through precommercial and commercial thinning.
Elite silviculture — native species	Operations are aimed at increasing growth and improving the characteristics of selected trees of one or more desirable native species in short or pre-established rotations. It differs from intensive silviculture in that site conditions (e.g., drainage and fertilization) are improved and tree characteristics enhanced through pruning or shaping.
Elite silviculture — exotic or hybrid species	Operations are aimed at increasing growth and improving the characteristics of selected trees of one or more desired, fast-growing exotic or hybrid species in very short pre-established rotations. Competitor species are controlled on an ongoing basis and special attention is paid to site conditions (e.g., drainage and fertilization) and improving tree characteristics through pruning or shaping.

The intensity of the silvicultural scenarios is determined when the tactical and operational integrated forest management plans are drawn up. It is also taken into account in silvicultural prescriptions and helps better determine the required amount and precision of data to be collected in the diagnostic and effectiveness monitoring process.[79]

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

Table 14. Goals according to silvicultural intensity level

<table>
<tr><th>Extensive</th><th>Basic</th><th>Intensive/Elite</th></tr>
<tr><td>Harvesting and production equivalent to that of the natural forest</td><td>Harvesting and production higher than that of the natural forest</td><td>Optimal harvesting and production</td></tr>
<tr><td rowspan="3">Establishment and protection of natural regeneration</td><td>Establishment and protection of natural or artificial regeneration</td><td>Establishment and protection of natural or artificial regeneration</td></tr>
<tr><td rowspan="2">Management of forest composition and structure of the residual stand</td><td>Fine tuning of the forest composition, spacing between trees, and the structure of the residual stand</td></tr>
<tr><td>Growth optimization</td></tr>
</table>

8.3.2 Silvicultural treatments

The selected silvicultural treatments apply to high forest systems and are divided into two main age structures: regular and irregular.

[79] MRN (2013).

Briefly, a regular structure features trees in the same age class and of similar dimension. Irregular structures feature trees in two to four different age classes. Irregular structures can generally be maintained by a series of partial cuts spaced out over time.

For more information on these concepts, please refer to *Guide sylvicole du Québec*, Vol. 2, Part 1.

A summary of the region's silvicultural strategy is presented below for each main structural type and the following stand types:

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

The main purpose of the selected silvicultural scenarios and treatments is to manage forests and ensure their renewal by protecting natural advance regeneration or creating favorable conditions for its establishment. Reforestation and fill planting are used when natural regeneration with desirable species or species to be promoted is insufficient or when they would take too long to establish. The aim of subsequent silvicultural work is to encourage desirable species or species to be promoted and manage species to be controlled without using herbicides. In many cases, silvicultural operations are designed to address a number of issues, including age structure, other uses, and the increasing scarcity of certain species.

8.3.2.1 Silvicultural strategy for boreal softwood stands

Silvicultural strategy for boreal softwood stands	
Regular structure	
Cutting with protection of regeneration and soils (CPRS) *Cutting with protection of high regeneration and soils (CPHRS)*	These treatments consist of harvesting all or almost all trees of commercial value in the stand in one operation while preserving new growth and the soil. New growth is mainly composed of seedlings when CPRS is used, and saplings in the case of CPHRS.

Cutting with protection of small merchantable trees (CPSMT)	This treatment consists of harvesting trees with DBHs[80] greater than 13, 15, or 17 cm and protecting as many softwood trees with DBHs under this threshold (seedlings, saplings, and small merchantable trees). This treatment reduces the rotation period of the future stand. It is recommended for stands dominated by black spruce, balsam fir, and white spruce with a density of C or D and containing enough small merchantable trees and saplings.
Commercial thinning (CT)	The purpose of this partial cut treatment is to harvest some of the merchantable trees in a planted or natural stand at the premature stage of a regular age structure to distribute the production potential over a limited number of well spaced trees. This increases the growth of the residual trees, enabling them to reach a greater size at maturity. Commercial thinning should be practiced in planted or natural stands that have undergone precommercial thinning in the past.
Irregular structure	
Irregular shelterwood cutting with slow regeneration (ISCSG)	This treatment consists of a series of two or three partial cuts spread out over more than a fifth of the planned rotation. The purpose of the first partial cut is to establish the regrowth and harvest mature trees. Another cut between the initial and final cuts may also be done if there is a need to partially release the regrowth from a forest cover that is too closed and to allow it to grow in a forest environment. A final cut is made after a fifth of the rotation, when the regrowth is well established. The treatment is used mainly in softwood stands with a greater quantity of red spruce, eastern white cedar, white spruce, and black spruce. Since the risk of windfalls is higher after a partial cut in boreal softwood stands, potential sites and their exposure to wind must be carefully analyzed before prescribing this treatment.

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

A management approach promoting a regular structure should be used in stands that do not have three distinct cohorts or in stands that have been impoverished by previous operations.

Silvicultural strategy for tolerant hardwood stands and mixed stands with tolerant hardwoods	
Regular structure	
Regular shelterwood cutting (RSC)	This treatment aims to quickly regenerate a stand (in less than a fifth of the rotation) with a series of two or three partial cuts over a short period of time. The purpose of the first partial cut is to establish the regrowth and harvest mature trees. Another cut between the initial and final cuts may also be done if there is a need to partially release the regrowth from a forest cover that is too closed and to allow it to grow in a forest environment. A final cut is made once the regrowth is well established.

[80] Diameter at breast height

Seed cutting (SEC)	This treatment consists of a total cut that preserves 10 to 30 well spaced seed trees per hectare in order to naturally reseed the treated area. The seed trees are conserved as a biological legacy as they will not be harvested.
Cutting with protection of regeneration and soils (CPRS)	This treatment is used only in cases where the stand does not have enough good quality trees to ensure the maintenance of a permanent canopy but where there is abundant regeneration of desirable species. It removes only the overstory and must ensure adequate protection of the regrowth.
Irregular structure	
Selection cutting (SC)	This intensive treatment consists of a series of partial cuts made at regular intervals (25 to 30 years) in a stand with an irregular or balanced structure. Trees to be harvested are chosen individually, in groups, or by patch in order to achieve or maintain a balanced diameter structure. This supports long-term production of high quality timber. This type of cut is used in maple stands and stands dominated by sugar maple with persistent and tolerant or semi-tolerant hardwood or softwood species. These are high quality stands with a structure that has enough trees in small or medium-sized patches to allow sustained harvesting of high quality timber. Selection cutting is appropriate for high-density stands on deep, fertile soils.
Irregular shelterwood cutting with permanent cover (ISCPC)	This treatment consists of a series of partial cuts spread out over more than a fifth of the planned rotation. The cuts are designed to harvest, regenerate, tend, and improve the stand and regrowth. These partial cuts must permanently preserve the forest cover (40% cover or more with trees of merchantable size), and there is no final cut. This type of cut is appropriate for stands with a structure that enables periodic harvesting of quality timber.
Irregular shelterwood cutting with slow regeneration (ISCSG)	This treatment consists of a series of two or three partial cuts spread out over more than a fifth of the planned rotation. The purpose of the first partial cut is to establish the regrowth and harvest mature trees. Another cut between the initial and final cuts may also be done if there is a need to partially release the regrowth from a forest cover that is too closed and to allow it to grow in a forest environment. A final cut is made after a fifth of the rotation, when the regrowth is well established.

Particular features of tolerant hardwood strata and mixed strata with tolerant hardwoods

Mineralized sugar maple zone

Growth conditions are harder for sugar maple near the northern limit of its range, which means logs of poorer quality are produced. Discoloration of sugar maple heartwood is a natural process caused by injuries in the canopy (slow healing of broken branches, faulty pruning) and trunk (cracks and frost and logging injuries).

A mineralized maple zone has been identified, which limits management options for producing quality sugar maple. This zone corresponds to FMUs **073-52** and **074-51**. Selection cutting is not possible in this zone because of the low quality of the sugar maples. Maples and northern tolerant hardwood stands are more extensively managed than sugar maple because of the low quality of the trees. On sites suitable for yellow birch, the goal is to increase the proportion of this species in these stands using irregular and regular shelterwood cuts. Yellow birch was previously more abundant in these areas.

Impoverished and degraded forests

Hardwood and mixed forests in southern Québec have been harvested for over 200 years. Certain forestry practices in the past impoverished or degraded some stands, rendering them less profitable to harvest today or making it necessary to spend more on silvicultural operations than current budgets allow.

Allowable cut calculations for 2018–2023 indicate that nearly 195,000 ha have been impoverished and degraded, i.e., 10% of the productive forest land in the Outaouais region.

Characterization of these forests is required and will be carried out using the fifth forest inventory program and the associated inventory data. This work will get underway once the data is available in 2018.

American beech invasion and beech bark disease

Stands with 20% or more of their basal area in American beech are considered to be invaded and will suffer the most damage caused by beech bark disease. The silvicultural strategy for these stands uses different treatments and harvesting methods than for stands dominated by sugar maple and tolerant hardwoods and focuses on removing diseased trees, preventing further invasion, and reducing damage caused by beech bark disease.

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

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

8.3.2.4 Silvicultural strategy for temperate softwood stands

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

Silvicultural strategy for temperate softwood stands	
Regular structure *(white and red pine stands)*	
Commercial thinning (CT)	With this treatment, some merchantable trees that are still premature are harvested to spread the production potential over a number of well spaced residual trees. Commercial thinning increases the quality of the remaining trees and the future stand and simplifies the species composition so it achieves the desired composition. Commercial thinning should be practiced in planted or natural stands that have undergone precommercial thinning in the past.
Regular shelterwood cutting (RSC)	This treatment aims to quickly regenerate a stand (in less than a fifth of the rotation) with a series of two or three partial cuts over a short period of time. The purpose of

	the first partial cut is to establish the regrowth and harvest mature trees. Another cut between the initial and final cuts may also be done if there is a need to partially release the regrowth from a forest cover that is too closed and to allow it to grow in an appropriate forest environment. A final cut is made once the regrowth is well established.
Seed cutting (SEC)	This treatment consists of a total cut that preserves 10 to 30 well spaced seed trees per hectare in order to naturally reseed the treated area. The seed trees are conserved as a biological legacy as they will not be harvested.
Irregular structure	
Irregular shelterwood cutting with slow regeneration (ISCSG)	This treatment is used in white and red pine stands and cedar stands. It consists of a series of two or three partial cuts spread out over more than a fifth of the planned rotation. The purpose of the first partial cut is to establish the regrowth and harvest mature trees. Another cut between the initial and final cuts may also be done if there is a need to partially release the regrowth from a forest cover that is too closed and to allow it to grow in a forest environment. A final cut is made after a fifth of the rotation, when the regrowth is well established.
Irregular shelterwood cutting with permanent cover (ISCPC)	This treatment is used in cedar and hemlock stands. This treatment consists of a series of partial cuts spread out over more than a fifth of the planned rotation. The cuts are designed to harvest, regenerate, tend, and improve the stand and regrowth. These partial cuts must permanently preserve the forest cover (40% cover or more with trees of merchantable size), and there is no final cut.

8.3.3 Silvicultural scenarios

Table 15 shows possible silvicultural scenarios by management intensity for the main types of even-aged forests and Table 16 presents the options for the main types of uneven-aged forests.

Table 15. Possible silvicultural scenarios by management intensity — main even-aged forest types[81]

Main Forest Type	Management Intensity		
	Extensive Scenarios	**Basic Scenarios**	**Intensive and Elite Scenarios**
White birch stands	CPRS-CPRS	CPRS-SCA-REF-REL-CPRS CPRS-REL-CLE-CPRS ISCSG-SCA-FIL ISCSG	CPRS-SCA-PL-REL-CLE-CT-CPRS Plantings: spruce and pine
White birch-softwood stands	CPRS-CPRS	CPRS -SCA-REF-REL-CPRS CPRS-REL-CLE-CPRS ISCSG-SCA-FIL ISCSG	CPRS-SCA-PL-REL-CLE-CT-CPRS Plantings: spruce and pine
Spruce stands	CPRS-CPRS CPSMT-CPRS	ISCSG-SCA-FIL-REL CPRS-REL-CLE-CPRS CPRS-SCA-REF-REL-CLE-CPRS CPHRS-FIL-REL-CLE-CPRS	CPRS-SCA-PL-REL-CLE-CT-CPRS CT- CPRS (for stands that have already been tended) CPRS-PCT-CT-CPRS
Poplar stands	CPRS-CPRS	ISCSG-SCA-FIL ISCSG	CPRS-SCA-PL-CPRS PI: hybrid poplars
Poplar-softwood stands	CPRS-CPRS	ISCSG-SCA-FIL ISCSG	CPRS-SCA-PL-CPRS PI: hybrid poplars
Jack pine stands	CPRS-CPRS	CPRS-REL-CLE-CPRS CPRS-SCA-REF-REL-CLE-CPRS	CPRS-SCA-PL-REL-CLE-CT-CPRS CPRS-SCA-PL-CT-CPRS CT-CPRS (tended stands)
Softwood-hardwood stands	CPRS-CPRS	ISCSG-SCA-FIL-REL CPRS-REL-CLE-CPRS CPRS-SCA-REF-REL-CLE-CPRS	CPRS-SCA-PL-REL-CLE-CT-CPRS
Balsam stands	CPRS-CPRS CPSMT-CPRS	CPRS-REL-CLE-CPRS CPRS-SCA-REF-REL-CLE-CPRS CPHRS-FIL-REL-CLE-CPRS	CPRS-SCA-PL-REL-CLE-CT-CPRS

[81] **Acronyms for silvicultural treatments:** Cutting with protection of high regeneration and soils (CPHRS); Irregular shelterwood cutting with slow regeneration (ISCSG); Cutting with protection of small merchantable trees (CPSMT); Cutting with protection of regeneration and soils (CPRS); Release (REL); Commercial thinning (CT); Precommercial thinning (PCT); Cleaning (CLE); Intensive planting at 2,000 plants/ha (PL); Scarification (SCA); Basic reforestation at 1,600 plants/ha (REF); Fill planting (FIL)

Table 16. Possible silvicultural scenarios by management intensity - main uneven-aged forest types[82]

Main Forest Type	Management Intensity		
	Extensive Scenarios	Basic Scenarios	Intensive and Elite Scenarios
Red maple stands	CPRS-CPRS	ISCSG-SCA-FIL ISCSG-SCA-SEE-REL-CLE ISCSG (with or without SCA) CPRS-SCA-REF-REL-CLE CPRS-REL-CLE	CPRS-SCA-PL-REL-CLE-CT
Tolerant hardwoods	CRS-SCA CPRS-CPRS	ISCSG (with or without SCA) RSC-SCA-CLE CRS-REL-CLE CRS-SCA-REL-CLE ISCSG-REL-CLE ISCSG-SCA-SEE-REL-CLE RSC-SEE-REL-CLE RSC-SCA-FIL-REL-CLE RSC-SCA-REL-CLE RSC-SCA CPRS-REL-CLE	SC ISCPC PSC-SCA CRS-PCT-CT CRS-CT-PRU RSC-SCA-PCT-CT RSC-SEE-REL-CLE-PCT-CT RSC-SCA-FIL-REL-CLE-PCT-CT RSC-CT-PRU RSC-SCA-REL-CLE-PCT-CT CPRS-REL-CLE-PCT-CT CPRS-PCT-CT-PRU CT-PRU ISCSG-REL-CLE-PCT-CT
Softwood-tolerant hardwoods	CPRS-CPRS CRS-SCA	ISCSG (with or without SCA) ISCSG-REL-CLE ISCSG-SCA-SEE-REL-CLE RSC-SCA-REL-CLE RSC-SCA CPRS-REL-CLE CRS-SCA-REL-CLE	ISCPC RSC-SCA-REL-CLE-PCT-CT RSC-CT-PRU CPRS-REL-CLE-PCT-CT CPRS-PCT-CT-PRU CT-PRU ISCSG-REL-CLE-PCT-CT
White pine stands		ISCSG ISCSG-REL-CLE	CT-PRU RSC-SCA-FIL-REL-PRU-CLE RSC-SCA-SEE-REL-PRU-CLE RSC-CT-PRU CRS-SCA-REF-REL-PRU CRS-PCT-CT-PRU ISCSG-CT-PRU ISCSG-REL-CLE-PCT-CT ISCSG-SCA-FIL-REL-PRU-CLE ISCSG-SCA-SEE-REL-PRU-CLE
Hemlock stands		ISCPC (with or without SCA)	
Cedar stands		ISCPC (with or without SCA) ISCSG (with or without SCA) ISCSG-REL-CLE ISCSG-SCA-SEE-REL-CLE	

[82] **Acronyms for silvicultural treatments**: Irregular shelterwood cutting with slow regeneration (ISCSG); Irregular shelterwood cutting with permanent cover (ISCPC); Cutting with protection of regeneration and soils (CPRS); Regular shelterwood cutting (RSC); Seed cutting (SEC); Selection cutting (SC); Patch selection cutting (PSC); Release (REL); Commercial thinning (CT); Precommercial thinning (PCT); Cleaning (CLE); Intensive planting at 2,000 plants/ha (PL); Scarification (SCA); Basic reforestation at 1,600 plants/ha (REF); Fill planting (FIL); Seeding (SEE); Pruning (PRU).

8.4 Climate change

One of the anticipated impacts for Quebec in the coming decades is the increased frequency and intensity of extreme events in the south (flooding, intense rain, drought), as well as the frequency of ravaging insect epidemics and forest fires. Climate may significantly change the composition, structure, and functioning of forest ecosystems, particularly for species growing near the southern limits of their ranges. The risk of these trees poorly adapting to the new climate conditions is more significant in southern Quebec[83]. Poor adaptation can result in slowed growth, wilting, death or regeneration problems, etc.

Faced with this situation, the MFFP must devise and implement a process for assessing ecological vulnerabilities and risks relating to forest management. The objective is to put in place an adaptation process for ensuring the responsible management and development of forests that take into consideration the most advanced knowledge available.

Under the terms of the 2013-2020 Climate Change Action Plan, the MFFP is responsible for evaluating the vulnerability of forests and forest activities to climate change. In the 2015-2018 Quebec Government Action Plan, the forestry sector listed the integration of a risk management approach for natural disturbances and climate change in forest development among its priorities. More specifically, it is responsible for overseeing the development of a sectorial action plan to weigh climate change as it relates to forest development.

Accordingly, in 2015, the MFFP put in place a committee on adapting to climate change. This committee's work will culminate in the production of a ministerial strategy for adapting to climate change from the perspective of forest management and development. This will help to reduce the anticipated risks of climate change for forests and to reap potential benefits from the new climate conditions in Quebec. This strategy will also address the links between adapting and mitigating, to benefit from synergies and avoid conflicts. This adaptation strategy will be included in the 2023 -2028 TIFMP.

The committee's climate change adaptation objectives are:

- To develop a shared vision of the anticipated effects of climate change on forests;
- To coordinate ministerial forest development initiatives in sync with climate change adaptation efforts;

[83] PERIE et DE BLOIS (2015).

- Identify forest management issues based on vulnerability analyses
- Develop and distribute tools (e.g., tool for forecasting regeneration accidents, a tree habitat model, a genetic origin management tool)
- Draw up recommendations on forest management with a view to integrating them into forestry plans and operations

Several initiatives led by ministerial departments or partner organizations are in progress with a view to better understanding the impact of climate change on our forests and on the benefits they provide for society. Here are a few examples:

→ *Effects of climate change on the Quebec tree habitat*

Under the 2006-2012 and 2013-2020 Quebec Action Plans on Climate Change, the Direction de recherche forestière began a scientific initiative to assess the effect of climate change on the possible distribution of tree-friendly habitat conditions. The approach used in the study combined the habitat models and weather projections for the end of the 21st century. For more information:

http://mffp.gouv.qc.ca/les-forets/impact-des-changements-climatiques/

→ *Ecosystem development*

The evaluation of the ecosystem development implementation, which covers the maintenance of key ecological attributes and processes was carried out by the Comité d'experts sur l'aménagement écosystémique des forêts et les changements climatiques[84] . It has been demonstrated that several measures included in the ecosystem development plan focus on the forest's ability to resist change and become more resilient during future disturbances. These forests should be able to adapt when ecological transitions become inevitable. In some cases, new means will have to be devised to adapt to new conditions, as is the case for plant composition, which could change in the coming decades. For more information:

http://mffp.gouv.qc.ca/les-forets/amenagement-durable-forets/lamenagement-ecosystemique-au-coeur-de-la-gestion-des-forets/

[84] COMITÉ D'EXPERTS SUR L'AMÉNAGEMENT ÉCOSYSTÉMIQUE DES FORÊTS ET LES CHANGEMENTS CLIMATIQUES (2017).

→ ***At the regional level***···

In addition to implementing ecosystem development, some measures were integrated into the 2018-2023 strategy for the Outaouais Region.

- Jack pine is the softwood species most likely to have trouble adapting in the Outaouais region. Its use for reforestation is limited to jack pine stands harvested in FMUs 073-52 and 074-51. Red and white pine will replace jack pine in the other FMUs.
- When sites for intensive management of yellow birch are selected, special attention is paid to drought risk to ensure that water stress does not put the investment at risk.
- The choice of species selected for the lumber production strategy was influenced by species' vulnerability to habitat changes in the Outaouais region.

8.5 Main roads and other infrastructure to build and maintain

The development, maintenance and management of the roads system and its infrastructure on public land is complex and involves numerous partners (RCM, forest industry, structured wildlife zone managers, other government ministries). In 2013, the MFFP produced the Cadre de gestion des chemins et des ponts en milieu forestier sur les terres du domaine de l'État with the objective of describing the forest road process to the Ministère. This management framework is presently under revision.

With the introduction of the new 2013 Forestry Plan, the roles and responsibilities relating to the development, maintenance and management of the road system and its infrastructure were redefined by the Ministère and forestry industry representatives. The following are the main responsibilities of the Ministère and the forestry industry.

Ministère

- Oversee the application of the laws, regulations and guides relating to the management of roads, bridges and culverts in forests;
- Oversee the management of forest road programs;
- Analyze and, if applicable, recommend temporary or permanent closure of forest roads;
- Conduct annual inspections of bridges under strict surveillance;
- Conduct cursory inspections of recreational bridges;
- Participate in the inspection of forest bridges;
- Post the bearing capacities and closures of forest roads;
- Oversee the quality (veracity, coherence and uniformity) of data relating to forest roads, bridges and culverts.

Forestry industry

- Devise a five-year plan for roads and infrastructures associated with potential development sectors.
- Prepare annual road and infrastructure programs while considering several important requirements such as: maximizing the use of the existing roads system, minimizing the number of water crossings, limiting new accesses to structured wildlife

areas, complying with the conditions for wildlife sites of interest, being particularly careful in sensitive zones identified by MFFP biologists.

The management of the roads system and its infrastructure is the responsibility of the Ministère, while the development (short and medium-term) and maintenance falls mainly on the forestry industry, although some RCMs and structured wildlife area managers are also involved. For this to be possible, various financial assistance programs for forestry industry stakeholders have been introduced over the years to support the development and maintenance of the road system and its infrastructures. Similar programs have also been created to financially support the work carried out by RCMs, structured wildlife zone management companies, and Indigenous communities.

Main roads and other infrastructure have been identified to ensure a strategic access network for the development of all the region's forest resources. The main infrastructure on the following map has all been built, including the recent bridge on the Coulonge and the section of road that connects it to Chemin Bois Franc.

Substantial investments will be required to bring the main network up to standard. Since the new forest regime came into effect, supply guarantee holders have been responsible for planning roads and other infrastructure. They have completed a number of projects to improve the quality of access roads, but more still needs to be done. The demand for high quality roads is growing as the forest is increasingly used by other users. The cost of the required work must be spread out over a number of years. In this context, predictability is a key factor for long-term cost-sharing agreements and investment management. Unfortunately, unpredictability persists, in part due to the concerns of various forest users, as well as market fluctuations and processing plant shutdowns. An important factor in this unpredictability is the perception by other users that there is a lack of infrastructure funding from the BMMB, even though spending on the network is actually done through MFFP. The BMMB is part of MFFP.

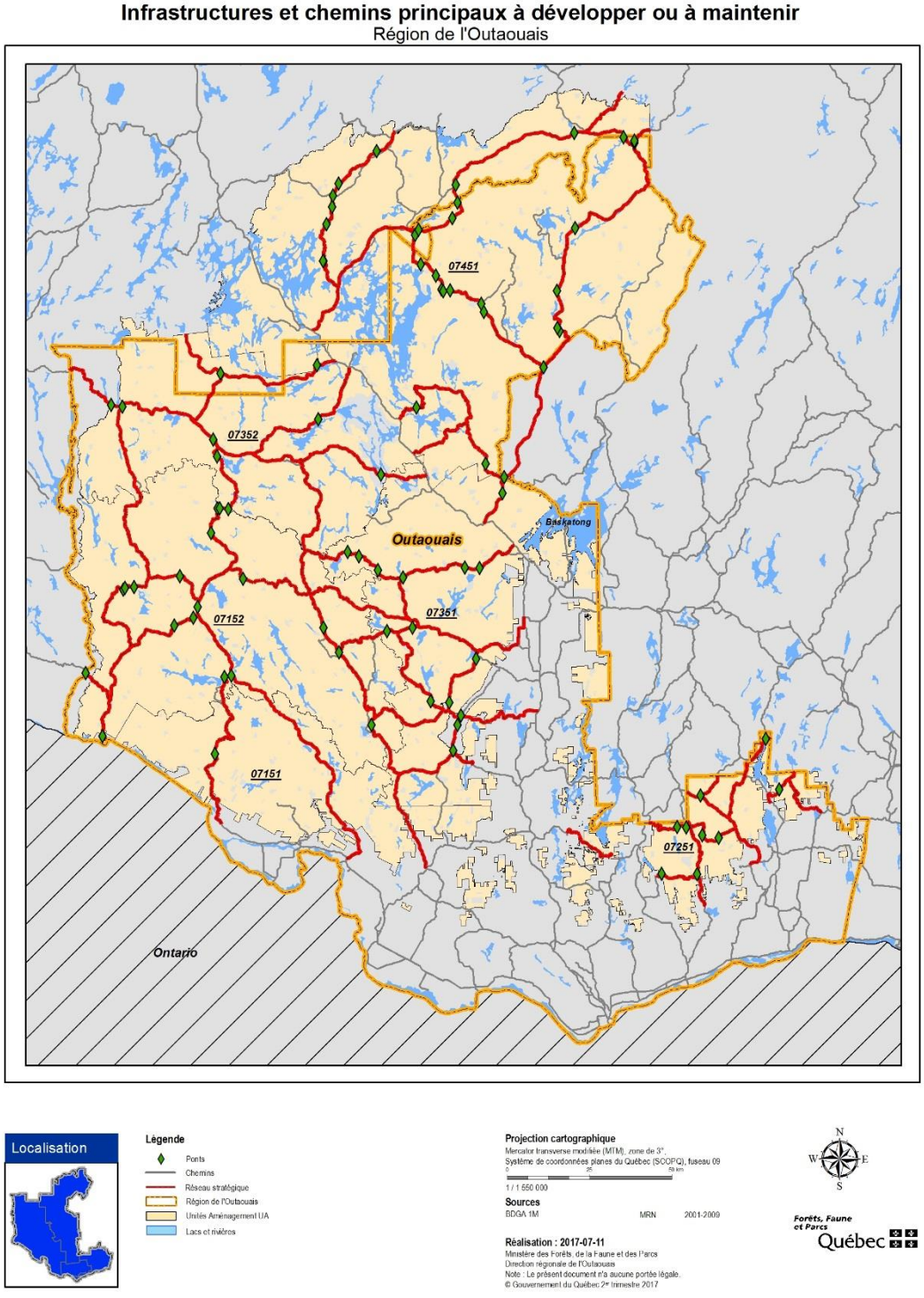


Figure 18. Main roads and other infrastructure to build and maintain

8.6 Allowable cut and management levels

The Chief Forester is responsible for determining allowable cut[85], which is the maximum volume that can be harvested annually in perpetuity without diminishing the forest's production capacity. Allowable cut takes into account certain sustainable forest management goals such as the natural dynamics of forests (e.g., composition, age structure) and their diverse uses.

The Chief Forester has updated the allowable cuts for FMUs 071-51, 073-51, 073-52 and 074-51 for 2018-2023. The allowable cuts for FMUs UA 071-52 and 072-51 have been renewed under the same conditions as for 2015-2018. Please note that the volume that can be allocated may differ from the volume resulting from allowable cut calculations. For example, some volumes may have been withdrawn because of a lack of users for pulp hardwood. Furthermore, allowable cuts are established as gross merchantable volume, i.e., no reduction for decay or unused wood is factored into the calculations[86]. The allowable cuts are available at the following address:

http://forestierenchef.gouv.qc.ca/documents/calcul-des-possibilites-forestieres/.

Table 17. Allowable cut by FMU for 2018–2023

Species	071-51	071-52	072-51	073-51	073-52	074-51	Total
FSPL	41,900	174 000	10 500	109 900	130 000	393 500	**859 800**
Eastern white cedar	6,800	40,400	4,900	20,800	19,300	47,800	**140 000**
Hemlock	4,900	5,000	13,400	3,500	300	-	**27 100**
White and red pine	48,200	77,800	2,600	41,500	28,300	25,000	**223 400**
Poplar	35,500	82,500	12,600	85,900	21,100	89,800	**327 400**
Paper birch	14,200	79,700	4,000	51,100	84,400	266,300	**499 700**
Yellow birch	21,800	69,300	8,200	54,700	46,700	57,700	**258 400**
Maple	75,000	116,900	34,100	139,600	50,800	50,400	**466 800**
Other hardwoods	66,000	38,400	15,800	65,300	1,400	2,200	**189 100**
Total	**314,300**	**684 000**	**106,100**	**572,300**	**382,300**	**932,700**	**2,991,700**

The following tables show the harvesting levels and planned work for 2018–2023 based on the allowable cut calculations. More information on these tables is available on the BFEC website. It should be noted that the degree to which the work will be completed depends on industry demand for wood and the budgets earmarked by MFFP for noncommercial work.

[85] Bureau du forestier en chef (2013).
[86] Bureau du forestier en chef (2014).

8.6.1 Management level — FMU 071-51

Table 18. Commercial treatments — average annual area

	Type of Treatment (ha/yr)			
Main Forest Type	Regeneration Cutting	Partial Cutting	Commercial Thinning	Total
White birch-softwood stands	10			10
Red maple stands		150		150
Tolerant hardwoods	70	1,540	170	1,780
Softwood-tolerant hardwoods		450		450
Poplar stands	40			40
Poplar-softwood stands	130			130
White pine stands		90	470	560
Softwood-hardwood stands	90			90
Spruce stands	80			80
Cedar stands		30		30
Total	**420**	**2,260**	**640**	**3,320**

Table 19. Breakdown of harvesting areas by constraint

	Forest Environment without Constraints	Structured Wildlife Areas	Landscapes	Orphan Stands	Forest Strips	Slopes	Other (WDY)	Total
Harvest (ha/yr)	1,520	1 005	130	290	250	45	80	3,320

Table 20. Noncommercial treatments — average annual area

	Silvicultural Treatments (ha/yr)				
Main Forest Type	Planting and Fill Planting	Cleaning/ Release	Precommercial Thinning	Pruning	Site Preparation
Poplar stands	10	10			10
Tolerant hardwoods	200		10		555
Red maple stands					100
Poplar-softwood stands	120	90	50	25	120
Softwood-tolerant hardwoods					265
Softwood-hardwood stands	80	110			80
Spruce stands	15	10			15
White pine stands	90	65	25	45	60
Cedar stands					10
Total	**515**	**285**	**85**	**70**	**1,215**

8.6.2 Management level — FMU 071-52

Table 21. Commercial treatments — average annual area

	Type of Treatment (ha/yr)			
Main Forest Type	Regeneration Cutting	Partial Cutting	Commercial Thinning	Total
White birch stands	320			320
White birch-softwood stands	330			330
Red maple stands		590		590
Tolerant hardwoods	90	1,660	20	1,770
Softwood-tolerant hardwoods		910		910
Poplar stands	150			150
Poplar-softwood stands	300			300
White pine stands		60	700	760
Jack pine stands	70			70
Hemlock stands		50		50
Softwood-hardwood stands	870	0		870
Balsam stands	40			40
Spruce stands	220			220
Cedar stands		310		310
Total	**2,390**	**3,580**	**720**	**6,690**

Table 22. Breakdown of harvesting areas by constraint

	Forest Environment without Constraints	Structured Wildlife Areas	Landscapes	Orphan Stands	Forest Strips	Slopes	Total
Harvest (ha/yr)	3,220	2,360	120	705	220	65	6,690

Table 23. Noncommercial treatments — average annual area

	Silvicultural Treatments (ha/yr)				
Main Forest Type	Planting and Fill Planting	Cleaning/Release	Precommercial Thinning	Pruning	Site Preparation
Tolerant hardwoods	115				460
Red maple stands					410
White birch-softwood stands	45				45
Poplar-softwood stands	120	100	50	25	120
Softwood-tolerant hardwoods					420
Softwood-hardwood stands	300	725			300
Spruce stands	100	90			100
Jack pine stands	60				60
White pine stands	70	50	20	35	50
Cedar stands					95
Hemlock stands					15
Total	**810**	**965**	**70**	**60**	**2,075**

8.6.3 Management level — FMU 072-51

Table 24. Commercial treatments — average annual area

	Type of Treatment (ha/yr)			
Main Forest Type	Regeneration Cutting	Partial Cutting	Commercial Thinning	Total
Red maple stands		30		30
Tolerant hardwoods		730		730
Softwood-tolerant hardwoods		270		270
Poplar stands	20			20
Poplar-softwood stands	60			60
Hemlock stands		160		160
Softwood-hardwood stands	10			10
Cedar stands		50		50
Total	**90**	**1,240**	**0**	**1,330**

Table 25. Breakdown of harvesting areas by constraint

	Forest Environment without Constraints	Structured Wildlife Areas	Landscapes	Orphan Stands	Forest Strips	Slopes	Other (WDY)	Total
Harvest (ha/yr)	455	460	75	115	80	30	115	1,330

Table 26. Noncommercial treatments — average annual area

	Silvicultural Treatments (ha/yr)				
Main Forest Type	Planting and Fill Planting	Cleaning/Release	Precommercial Thinning	Pruning	Site Preparation
Poplar stands	5	10	10	5	5
Tolerant hardwoods			15		40
Red maple stands					20
Poplar-softwood stands	40	30	15	5	40
Softwood-tolerant hardwoods	5				130
Softwood-hardwood stands	10	25			10
Spruce stands	5				5
Cedar stands					15
Hemlock stands					50
Total	**65**	**65**	**40**	**10**	**315**

8.6.4 Management level — FMU 073-51

Table 27. Commercial treatments — average annual area

	Type of Treatment (ha/yr)			
Main Forest Type	Regeneration Cutting	Partial Cutting	Commercial Thinning	Total
White birch stands	100			100
White birch-softwood stands	190			190
Red maple stands		10		10
Tolerant hardwoods	340	2,020	10	2,370
Softwood-tolerant hardwoods	50	660		710
Poplar stands	350			350
Poplar-softwood stands	340			340
White pine stands		70	210	280
Jack pine stands	20			20
Softwood-hardwood stands	440			440
Balsam stands	30			30
Spruce stands	120	80	10	210
Cedar stands		140		140
Total	**1,980**	**2,980**	**230**	**5,190**

Table 28. Breakdown of harvesting areas by constraint

	Forest Environment without Constraints	Structured Wildlife Areas	Landscapes	Orphan Stands	Forest Strips	Slopes	Other (WDY)	Total
Harvest (ha/yr)	970	2,700	605	530	160	65	160	5,190

Table 29. Noncommercial treatments — average annual area

	Silvicultural Treatments (ha/yr)				
Main Forest Type	Planting and Fill Planting	Cleaning/Release	Precommercial Thinning	Pruning	Site Preparation
Poplar stands	30	30			35
Tolerant hardwoods	210		20		620
Red maple stands					5
White birch-softwood stands	105	240			105
Poplar-softwood stands	245	215	115	60	245
Softwood-tolerant hardwoods					335
Softwood-hardwood stands	60	50			60
Spruce stands					55
Balsam stands	20	65			20
Jack pine stands	15				15
White pine stands	60	35	25	30	40
Cedar stands					55
Total	**745**	**635**	**160**	**90**	**1 590**

8.6.5 Management level — FMU 073-52

Table 30. Commercial Treatments — average annual area

	Type of Treatment (ha/yr)			
Main Forest Type	Regeneration Cutting	Partial Cutting	Commercial Thinning	Total
White birch stands	90			90
White birch-softwood stands	1 080			1,080
Red maple stands		40		40
Tolerant hardwoods	40	570		610
Softwood-tolerant hardwoods	130	60		190
Poplar-softwood stands	20			20
White pine stands		110	70	180
Jack pine stands			10	10
Softwood-hardwood stands	780			780
Spruce stands	380	80	30	490
Cedar stands		90		90
Total	**2 520**	**950**	**110**	**3,580**

Table 31. Breakdown of harvesting areas by constraint

	Forest Environment without Constraints	Structured Wildlife Areas	Landscapes	Orphan Stands	Forest Strips	Slopes	Total
Harvest (ha/yr)	840	2,050	280	325	75	10	3,580

Table 32. Noncommercial treatments — average annual area

	Silvicultural Treatments (ha/yr)				
Main Forest Type	Planting and Fill Planting	Cleaning/ Release	Precommercial Thinning	Pruning	Site Preparation
Tolerant hardwoods					200
Red maple stands					25
White birch-softwood stands	15	35			5
Poplar-softwood stands	15	10			20
Softwood-tolerant hardwoods					140
Softwood-hardwood stands	480	590			435
Spruce stands	285	240	20		340
Jack pine stands					
White pine stands	115	115		60	80
Cedar stands					30
Total	**910**	**990**	**20**	**60**	**1,275**

8.6.6 Management level — FMU 074-51

Table 33. Commercial treatments — average annual area

	Type of Treatment (ha/yr)			
Main Forest Type	Regeneration Cutting	Partial Cutting	Commercial Thinning	Total
White birch stands	490			490
White birch-softwood stands	3,790	60		3,850
Tolerant hardwoods		370		370
Softwood-tolerant hardwoods		460		460
Poplar-softwood stands	110			110
White pine stands		30		30
Jack pine stands	130		20	150
Softwood-hardwood stands	1,490	290		1,780
Spruce stands	900	480	60	1,440
Cedar stands		300		300
Total	**6,910**	**1,990**	**80**	**8,980**

Table 34. Breakdown of harvesting areas by constraint

	Forest Environment without Constraints	Structured Wildlife Areas	Landscapes	Orphan Stands	Forest Strips	Slopes	Total
Harvest (ha/yr)	1,680	5,750	655	685	150	60	8,980

Table 35. Noncommercial treatments — average annual area

	Silvicultural Treatments (ha/yr)				
Main Forest Type	Planting and Fill Planting	Cleaning/Release	Precommercial Thinning	Pruning	Site Preparation
Tolerant hardwoods					125
White birch-softwood stands	815	1,135			700
Poplar-softwood stands	10	10	5	5	10
Softwood-tolerant hardwoods					160
Softwood-hardwood stands	330	805			485
Spruce stands	55	55	40		390
Jack pine stands	105	10	20		100
White pine stands	35	35		20	25
Cedar stands					90
Total	**1,350**	**2,050**	**65**	**25**	**2,085**

PART 5: FORESTRY MONITORING

9 Forestry Monitoring

Forestry monitoring is used to check whether objectives have been met and the instructions arising from the forest management strategy have been followed. The monitoring results provide important information for ensuring continuous improvement of forestry practices. This section covers compliance and effectiveness monitoring.

9.1 Outline of plan implementation

Silvicultural prescriptions and their marking and operational instructions guide the work in the field. The prescriptions also take into account harmonization measures agreed upon with other users. Silvicultural prescriptions can be seen as the specifications for the contract between MFFP and the forest management operator. They are the basis on which the forest management strategy is carried out.

The work performed by the forest management operators is supervised in the field by MFFP:

1. Before the work begins, MFFP meets with the operators to explain the silvicultural prescription, including the operational instructions.
2. During the field work, MFFP follows up on the preliminary meeting with site visits to check that the company clearly understands and is properly implementing the silvicultural prescription.
3. When the work is finished, the operator must confirm in its activity report that it has carried out the work according to the silvicultural prescription and operational instructions.

9.1.1 Monitoring of the 2018–2023 management strategy

The forest management strategy is the best guarantee of sustainable forest production.

Its key aspects are highlighted and monitored to check to what degree the management goals (ecosystemic, forestry, and economic) have been met. Monitoring tables are drawn up for these aspects, presenting targets and acceptable leeways.

The following aspects are monitored:

1. Allowable cut and supply guarantees
2. Forest management work
3. Harvesting, according to operational difficulties (major constraints)
4. Harvesting rates per FMU (age structure)
5. VOITs
6. Economic and financial profitability indicators

Numerous tools are available or are being developed to help the implementation teams with monitoring and operational planning (OIFMP):

1. Digital layers
    - Digital layer based on the forest management strategy
    - Digital layer of current forest practices
    - Digital layer of infrastructure
    - Digital layer of major constraints
    - Digital layer of allowable cut and species to be promoted
    - Digital layer of FMUs

2. Diagnostic tools
    - Silvicultural treatment filter
    - Forest type and main forest type filter
    - Economic analyses

The most important monitoring aspects are included in the environmental certification process and are subject to an annual management review. The review evaluates the relevance and effectiveness of the indicators and triggers the necessary steps if the goals are not met.

Tactical planning is a continuous process, which means that certain aspects may be applied in the field at different points during the TIFMP's implementation. For example, new local management objectives may be proposed by the TRGIRTOs and approved by MFFP.

9.2 Types of forest monitoring

Guide d'inventaire et d'échantillonnage en milieu forestier classifies the different types of forest monitoring to help standardize the process of evaluating whether management goals have been met. The categories differ mainly in terms of the aspects measured and the geographical scale. Compliance monitoring and effectiveness monitoring are

performed at the work site shortly after the work being has been completed. Both these categories are closely related to the assessment of how well the forest management strategy is being applied and to the tactical and operational planning process.

The three other monitoring categories (reference, verification, and implementation) generally apply to large areas or specific needs. Monitoring can help evaluate implementation of the forest management strategy, but is usually separate from the planning process.

9.2.1 Compliance monitoring

Compliance monitoring is also known as “compliance control.” Its purpose is to check whether management activities comply with instructions in a prescription, as well as standards, and regulations.

MFFP relies on self-monitoring by operators and on the forestry professionals who sign off on the operators’ work. MFFP uses sampling to check the forest engineer’s declaration upon completion of the work.

This approach enables MFFP to verify that the work is compliant while encouraging operators to take responsibility for their actions. The risk-based sampling approach is stipulated in the regional monitoring plans (RCP). Monitoring frequency and intensity are based on work intensity, treatment complexity, environmental risks, and the operators’ previous performance. Regarding the commitments of MFFP’s regional operational sector set out in its environmental and forestry policy, the objective of this approach is to detect problems before they get out of hand and cause significant and irreversible damage to the forest and the organization. The process is flexible to permit ongoing risk assessment. Based on the monitoring results, forest management practices and strategies can be adapted and improved.

Compliance monitoring is performed as soon as the work is finished as an operational check on how the treatment was applied.

9.2.2 Effectiveness monitoring

The purpose of effectiveness monitoring is to verify whether the means used to conduct the work have achieved the objectives of the silvicultural prescription. Regrowth establishment and development are key objectives of most forest management work. However, effectiveness monitoring may be used to check other criteria in the prescription.

MFFP has created a silvicultural intensity gradient, in part to make it easier to monitor silvicultural scenarios and better allocate the required work, as described in Section 8.3.1.

The priority of the effectiveness monitoring methods used, as well as their intensity and frequency, are based on available funds and the risk of failing to generate the desired return on investment. For example, priority is given to monitoring reforested areas to ensure that the selected scenarios generate the expected yields.

On May 31, 2017, the Auditor General of Québec (AGQ) tabled the results of a performance audit on the silvicultural work under the responsibility of MFFP. The audit report provided ten recommendations on how to correct the observed shortcomings, including one recommendation specifically on effectiveness monitoring:

"Monitor to assess whether the silvicultural work has yielded the desired results, identify corrective measures, and promote continuous improvement of practices."

MFFP agrees with all the recommendations and will submit an action plan to the AGQ with initiatives responding to each recommendation.

Direction générale du secteur du sud-ouest will help implement MFFP's action plan, adapt its monitoring program accordingly, and ensure that it is carried out.

Signatures

Professional responsibility

The Integrated Tactical Forest Development Plan for management units 071-51, 071-52, 072-51, 073-51, 073-52, 074-51 was produced under my professional responsibility, in compliance with the legislation, regulations and agreements in force, and with the objectives set by the Minister of Forests, Wildlife and Parks. The plan was also produced using the best available, most relevant information on this date, including information provided by the persons named below.If they are any discrepancies between the French and the English versions, the French one will official.

2018.05.09

Isabelle Paquin, ing.f. Date

In addition, I certify that the following forest engineers also contributed to the preparation of this forest development plan, for the work listed below :

2018-05-09

Anouk Pohu, ing.f. Date

Responsible for: 7.1.7, 8.2.3.5
Contributions : 7.1.2, 7.1.3, 7.2, 7.3, 8.2, 8.3, 9.1.

2018-05-09

Sébastien Meunier, ing.f. Date

Responsible for: 8.2.3, 8.3, 8.4
Contributions : 6.3, 7.1.5, 8.1, 8.2

2018.05.09

Isabelle Paquin, ing.f. Date

Responsible for: 6, 8.2.1, 8.2.2, 8.2.4, 8.2.5
Contributions : 8.2.3.3, 8.2.3.5, 8.3, 9.1

2018-06-07

François Boucher, ing.f. Date

Contributions : 8.3, 8.2.1, 8.2.2, 8.2.3.3, 8.2.3.5

Administrative responsibility

Approval of the Tactical Plan by the MFFP

Pierre Date: 2018-05-08

Acting Director of Regional Forest Management

APPENDIX A

TRGIRTO participants and experts who helped draft the TIFMP

Forest management team :

Anouk Pohu, ing.f.
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Frédéric Joubert, ing.f.
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Isabelle Paquin, ing.f.
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Cathy Labrie, ing.f.
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Danielle Leblanc, ing.f.
Jacquelines Tremblay, tech.for.
Christian Pilon, t.a.g.
Héloïse Rheault, bio.
Vicky Cadieux

APPENDIX B

TRGIRTO participants

Sectoral Groups	Partners
WOOD 4 representatives	• Forest industry
WILDLIFE 4 representatives	• SEPAQ[87] (La Vérendrye and Papineau-Labelle wildlife sanctuaries) • ZECO[88] • Association des pourvoyeurs de l'Outaouais • Association provinciale des trappeurs indépendants — Conseil de l'Outaouais • Fédération québécoise des chasseurs et pêcheurs — Outaouais
OTHER USERS WITH RIGHTS 5 representatives	• Regroupement des locataires de terres publiques Outaouais-Laurentides • Clubs in the Outaouais region belonging to Fédération des clubs de motoneigistes du Québec • Clubs in the Outaouais region belonging to Fédération québécoise des clubs Quads • The public • Forestry workers
NATURE 4 representatives	• Pôle d'excellence en récréotourisme de l'Outaouais • Conservation and environmental protection organizations
REGION 5 representatives	• Collines-de-l'Outaouais RCM • Papineau RCM • Pontiac RCM • Vallée-de-la-Gatineau RCM • La Vallée-de-l'Or RCM
FIRST NATIONS 5 representatives	• Algonquins of Lac-Barrière • Communauté Anicinape de Kitcisakik • Couseil de la Nation Anishnabe de Lac-Simon • Kitigan Zibi Anishinabeg • Wolf Lake Community

[87] Société des établissements de plein air du Québec
[88] Association des zones d'exploitation contrôlée de l'Outaouais

APPENDIX C

Requirements regarding wildlife sites of interest (WSI)[89]

WSI - Lakes

Type of activities	No.	WSI-1[90]	WSI-2[91]	Requirement[92]
				The requirements apply across the WSI, except when specified otherwise (the area is identified in MFFP's shapefile database.)
Forest plan	1	X		Keep the area that has undergone regeneration cuts of an average height of less than 3 m equal to or 10% smaller than the area of the WSI (excluding water).
	2		X	Keep the area that has undergone regeneration cuts of an average height of less than 3 m equal to or 20% smaller than the area of the WSI (excluding water).
	3	X		Keep the area of regeneration cuts per five-year period harvested using partial cuts equal to or 25% smaller than the WSI (excluding water).
	4		X	Keep the area of regeneration cuts per five-year period harvested using partial cuts equal to or 50% smaller than the WSI (excluding water).
	5	X	X	No introduction of exotic or fast-growing timber species is permitted. Only native timber species can be used. Mixed plantings should be promoted.
	6	X	X	No drainage, fertilization, or herbicides are permitted.
Roads	7	X	X	In fish habitat, building, improving, or renovating bridges and culverts, or replacing a culvert with one of the same size is permitted only during the periods listed in Table 1: Periods during which roadwork can be performed in fish habitat in a WSI
	8	X	X	In fish habitat, a filter curtain must be used when building, improving, or renovating bridges and culverts, or replacing a culvert with one of the same type.
	9	X	X	No exemption will be granted for building a road or trail 1 to 60 m from the main lake and its permanent tributaries or 0 to 30 m from its intermittent tributaries.
	10	X	X	No culvert with smooth interior walls will be used, except for drainage ditches or intermittent streams.
	11	X	X	No watercourse crossing can be installed within 500 m of the permanent tributaries of the main lake, except crossings that do not touch the bed of the watercourse, e.g., bridges or open-bottom culverts whose abutments or shoes are built outside the banks of the watercourse.
	12	X	X	Watercourses cannot be narrowed more than 20%, measured at the natural high water line.
Forestry operations	13	X	X	No forestry activities or machinery traffic are permitted in the forest strip 0–40 m from all lakes in the WSI.
	14	X	X	No machinery traffic is permitted in the forest strip 40–60 m from all lakes in the WSI. Apply the partial harvesting method described in Section 4 of the RSM.

[89] MFFP (2017).

[90] WSI-1: High conservation value lakes (HCVL), where 90% or more of the drainage unit is natural

[91] WSI-2 Other HCVLs and other WSIs

[92] When two land uses overlap, the most restrictive land use applies. If the requirements are compatible, they must all be applied. All references to the *Regulation respecting standards of forest management for forests in the domain of the State* (RSM) will be adapted to bring them in line with the RADF when the latter comes into force.

	15	X	X	No forestry activities or machinery traffic are permitted in the forest strip 0–20 m from all permanent watercourses in the WSI.
	16	X	X	No forestry activities or machinery traffic are permitted in the forest strip 20–40 m from all permanent watercourses in the WSI. Apply the partial harvesting method described in Section 4 of the RSM.
	17	X	X	Returning to the work site to harvest logging waste for commercial biomass is prohibited.
Wildlife management	18	X	X	No non-native wildlife species can be introduced in this water body.
	19	X	X	Fish stocking is permitted only to repopulate the main lake in the WSI.
	20	X	X	No ice fishing is permitted in the main lake of the WSI.
	21	X	X	With regard to trapping leases in WSIs, trapping camps associated with trapping rights and authorizations must be at least 60 m from the natural high water lines of lakes and permanent watercourses and 15 m from intermittent watercourses.
Development of vacation accommodations on public land	22	X	X	Commercial or community vacation accommodations are permitted.
	23	X		No private vacation accommodations are allowed.
	24	X		90% of the perimeter of each lake must be set aside for conservation purposes. The other 10% can be developed for commercial, community, or private vacation accommodations, but must provide public access.
	25		X	80% of the perimeter of each lake must be set aside for conservation purposes. The other 20% can be developed for commercial, community, or private vacation accommodations, but must provide public access.
	26	X	X	Only 30% of the trees can be cut in the 20–60 m riparian buffer zone in areas open to the public. Facilities (e.g., gazebos, boathouses, rest areas, boat ramps, etc.) may be authorized. These facilities must have minimal impact on the environment and be approved by MFFP or another competent authority. Parking facilities must be at least 60 m from the natural high water line.
	27	X	X	Vacation accommodations must be at least 60 m from the natural high water lines of lakes and permanent watercourses and 15 m from intermittent watercourses. Public access and community waterside infrastructure must be approved by MFFP.
	28		X	The riparian buffer zone in front of private cottages must be kept in a natural state. Access to a body of water greater than 5 m wide may be permitted subject to approval by MFFP or another competent authority.
	29	X	X	Only 30% of the trees can be cut in the 20–60 m riparian buffer zone in front of commercial or community vacation accommodations. The natural herbaceous vegetation must be preserved. Nonpermanent facilities such as rest areas (benches, picnic tables) can be installed in this zone if approved by MFFP or another competent authority.
	30	X	X	Lots for private vacation accommodations cannot be enlarged except for environmental or regulatory reasons.
	31	X	X	The capacity of the main lake in the WSI to handle new vacation accommodations must be evaluated before further development is permitted.
Other	32	X	X	No industrial or agricultural development is permitted.
	33	X	X	Recreational activities are permitted.
	34	X	X	Infrastructure and buildings (cabins or camp grounds) relating to mineral exploration rights must be at least 60 m from the natural high water lines of water bodies and permanent watercourses and at least 15 m from intermittent watercourses.

WSI - Spawning grounds

	Nº.	Requirement*
Spawning grounds in watercourses (streams and rivers)	1	No forestry activities or machinery traffic are permitted in the 0–40 m forest strip 60 m upstream and downstream of spawning grounds (on each side of the watercourse).
	2	No machinery traffic is permitted in the 0–40 m forest strip 60 m upstream and downstream of spawning grounds (on each side of the watercourse). Apply the partial harvesting method described in Section 4 of the RSM.
	3	No forestry activities or machinery traffic are permitted in the 0–20 m forest strip 60 m upstream and downstream stream of spawning grounds (on each side of the watercourse).
Spawning grounds in lakes	4	No forestry activities or machinery traffic are permitted in the 0–40 m forest strip 60 m along the shore on each side of the spawning grounds.
	5	No machinery traffic is permitted in the 0–40 m forest strip 60 m along the shore on each side of the spawning grounds. Apply the partial harvesting method described in Section 4 of the RSM.

*All references to the *Regulation respecting standards of forest management for forests in the domain of the State* (RSM) will be adapted to bring them in line with the RADF when the latter comes into force.

WSI - Kazabazua peat bogs

	Nº.	Requirement
WSI - Kazabazua peat bogs	1	No forestry activities are permitted in the WSI.
	2	No new road construction is permitted in the WSI.
	3	No development of private, commercial, or community vacation accommodations is permitted in the WSI.

APPENDIX D

Planned measures to create Areas of Increased Timber Production

Here is a brief description of the steps being taken or that will be taken to set up Areas of Increased Timber Production (AITP):

Localization of potential AIPLs by MFFP

To create a pool of potential areas of sufficient size that could be defined as AITPs, blocks of forest polygons with high timber production potential and few constraints must be prepared. Macro-zoning will be used to identify areas that are close enough to wood processing plants in the region. These pools of potential AITPs will be presented to Aboriginal communities and to the competent regional authority for public consultation. This step is underway.

Public consultations

The competent regional body and Aboriginal communities choose which of the potential AITPs (gross areas) proposed by Direction de la gestion des forêts they want to set aside for timber production based on regional community and Aboriginal priorities.

Identification of AITPs in the TIFMP

Direction de la gestion des forêts analyzes the proposals from the previous steps and determines which areas in the TIFMP will be used for increased timber production. Forest management activities in the AITPs will be specified in the TIFMP.

APPENDIX E

Economic analyses

Analysis level in the TIFMP

The analysis in the TIFMP is performed at the strata group level (group of similar strata to which the same silvicultural scenarios can be applied). The analysis covers the most representative strata groups according to the CFO's model for determining allowable cut[93] for 2013–2018 in each FMU. The strata groups analyzed cover over 60% of the area to be harvested in the region's FMUs in 2018–2023.

When strata groups and yields associated with treatments are used for calculating allowable cut, graphs describing changes in forest stands, called "treatment effect curves," can be taken into account. With these curves, it is possible to estimate product combinations for each harvesting activity associated with a given scenario.

Net economic profitability

Net economic profitability also considers the fact that forests produce value, even without logging.

Economic profitability analyses take this aspect into account by comparing the given scenario with a reference scenario. This figure must be considered when analyzing economic profitability to measure the additional wealth created by the investment. These characteristics are particularly important when evaluating the economic profitability of public investments, because the government must create as much wellbeing and wealth as possible with limited financial, human, and physical resources.

The cost corresponds to the sum of all costs associated with silvicultural work (planning, execution, and monitoring) for the entire scenario and revenues consist of royalties, company profits, additional income earned by forestry workers compared to what they would earn elsewhere, revenue from physical capital, the added value generated by treatments, and the allowable cut effect. Dollars per hectare and volumes per hectare are two units used in the calculations. No reduction was calculated for volumes.

[93] Bureau du forestier en chef (2013).

APPENDIX F

Summary of the Public Land Use Plan (PLUP)

The Plan d'affectation du territoire public de l'Outaouais comprises several government orientations for ensuring harmonious land development. These orientations are applied to identified zones of public land that present special characteristics justifying their selection for protection and use. Land use selection in each of the 41 zones making up the Outaouais Region is expressed by an intention, a territorial vocation and, if applicable, specific objectives. Selection sometimes calls for the reassignment of existing uses or vocations. Furthermore, while taking into consideration the zoning of public land, the selections represent opportunities and projects that could be important to the region.

The Plan d'affectation du territoire public de l'Outaouais emphasizes the application of protection zones, as is evidenced by the integration of four new planned biodiversity reserves and five territories of interest to be used for this purpose, as described in the Stratégie québécoise sur les aires protégées, coordinated by the ministère du Développement durable, de l'Environnement et des Parcs. These planned biodiversity reserves and territories of interest are distributed throughout the public land and will enable the Outaouais Region to make up significant lost ground that had built up over the years with respect to the protection of biodiversity. In fact, only Gatineau Park, Plaisance National Park, ecological reserves, exceptional forest ecosystems and legally constituted wildlife habitats were previously protected.

Further to the planned biodiversity reserves, the PLUP includes a planned exceptional forest ecosystem and a wildlife refuge project. Zones presently dedicated to protection represent 10.46% of public land, while the remaining 89.54% is developed.

With respect to land use and resources, the PLUP for the Outaouais Region is striving to ensure greater economic diversification while taking into consideration the imperatives of wildlife protection, biodiversity and the environment in general.

The PLUP place special emphasis on structured wildlife areas because the terms applicable to these will bring about greater accountability for wildlife and recreational activities in the use of land and resources. The PLUP also underscores the identification of wildlife sites of interest (SFI), which strives to maintain habitat quality for specific wildlife species in the Outaouais Region, primarily arctic char, brook trout and lake trout.

In short, the PATP for the Outaouais Region will help to guide government, regional and local partners in their sectorial planning. These individuals must ensure that their land and resource management practices are in line with the land use orientations determined by the government.

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