



**Research report on the production of
summaries of the state of forests by
municipality in the MRC des Collines-de-
l'Outaouais**



**Cartographier notre
forêt communautaire**
Mapping the Community Forest

Cover photo: Municipality of La Pêche, MRC des Collines-de-l'Outaouais

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Recommended citation for referencing this report:

Doucet, Chantale (2023). *Research report on the production of summaries of the state of forests by municipality in the MRC des Collines-de-l'Outaouais*. Delivered at the Outaouais Environmental Campus, Projets Territoires, 58 pages.

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This project was funded by :



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1. Background and objectives

The purpose of this research report is to provide an analysis of the health and evolution of forest cover in the municipalities of the MRC des Collines-de-l'Outaouais. This study is the first phase of the "Mapping our Community Forest" project, led by the Outaouais Environmental Campus. More specifically, this research documents the following aspects:

- The specific characteristics of the forest in each municipality.
- The evolution of human and natural disturbances affecting the forest.
- The impacts resulting from these disturbances.

To carry out this research, we compiled a variety of forestry, ecological, economic, historical and climatic data. These data were synthesized in an accessible and popularized way for use in the next stages of the Mapping Our Community Forest project. These steps include :

- The organization of a dozen public workshops, combining science and art, led by artist and community educator CJ Fleury. These workshops, which will begin during National Forest Week in September 2023, will enable the creation of collective works of art inspired by the content of the syntheses¹.
- The collective works of art will then be presented as part of a travelling exhibition starting in April 2024, in commemoration of Earth Day. Workshops will be held in each of the MRC's six municipalities to present and discuss the project's findings.

Ultimately, the Mapping Our Community Forest project offers residents and decision-makers a unique perspective on the evolution of our community forests, by:

- Increasing citizens' awareness, pride, knowledge and commitment to forests.
- Promote the value and benefits of sustainable forest management for people and the environment.
- Stimulate dialogue on the future of forests and the environment.

This report sets out the methodological approach and all the data and knowledge used to produce the summaries. It also makes it possible to compare data specific to each municipality.

¹ In the summaries, the forest stand demography map on page 5 will be used primarily as a source of inspiration.

2. Methodological approach

This section describes the methodological approach used to produce the summaries. We begin by presenting the data collection, which was mainly based on a documentary and statistical review. Next, we briefly explain the data analysis stage. Finally, we present the role and members of the monitoring committee.

Data collection: a documentary and statistical review

A documentary and statistical review was undertaken to gather information on the forest. Particular attention was paid to data available at municipal and MRC level², as well as at a finer scale, such as intramunicipal public territories within the MRC. Work carried out at the scale of the Outaouais region and for the hardwood forest in Quebec was also consulted to trace the evolution of human activities and natural disturbances on the forest, as presented in the syntheses. A variety of data sources were mobilized, including those provided by the Institut de la Statistique du Québec, the Ministère des Ressources naturelles et de la Forêt, and various organizations that have produced forest portraits.

Many of the data used to draw up the forest portrait were produced by the MRC des Collines-de-l'Outaouais, either as part of their Schéma d'aménagement et de développement (land use and development plan) or through research work they commissioned over time, carried out by organizations such as the Institut québécois d'Aménagement de la Forêt feuillue (ISFORT) and NovaSylva. This data has been essential to better understand the forest on their territory and guide their future interventions.

In addition, as a stakeholder in the Mapping the Community Forest project, the MRC provided us with original data by municipality, including a detailed map of forest stand demographics in the MRC and a cross-tabulated table of forest cover tenure and age by municipality. These data greatly contributed to refining the forest portrait for each municipality³.

A range of data has also been used to draw up a longitudinal portrait of human and natural disturbances and their effects on forest cover in the MRC and its municipalities. These

² The administrative boundaries of the territory have evolved over time, notably with the creation of the MRC des Collines-de-l'Outaouais in 1991 and until recently with the departure of Notre-Dame-de-la-Salette. It has been necessary to take these changes into account in the statistics. Unless otherwise indicated, the data presented in this report are based on the administrative boundaries of 2023, thus excluding the municipality of Notre-Dame-de-la-Salette.

³ Please note that some data may vary according to source and reference year.



include the Office of the Chief Forester's work on deciduous and mixed forests, focusing on the Outaouais (Boulet, 2015; Boulet and Pin, 2015); ISFORT's work on behalf of the Commission régionale sur les ressources naturelles et le territoire public de l'Outaouais, comparing the distribution of forest species in the 19th century with that of 2010 (Ortuno and Doyon, 2010); and the vignettes produced as part of the Outaouais forest history project⁴.

Finally, we also drew on various studies on the impacts of human and natural disturbances on the forest. The study by Doyon, Montpetit and Cyr (2012) proved particularly relevant in summarizing the impacts of climate change on the forest, as it was specifically carried out for the Outaouais forest.

The body of knowledge from the literature review is integrated throughout this research report. A list of the references used is available at the end of this document.

Data analysis and dissemination

Relevant information has been collected, grouped and cross-referenced by theme in order to structure the various parts of the report and summaries. The calculations required to obtain proportions, trends and comparisons, as well as the creation of graphs, were carried out using Excel software.

Given that the summaries will serve as inspiration for the creation of artworks and will be used as leverage for discussion during workshops, we paid particular attention to summarizing knowledge in the form of figures, maps and synthetic tables that capture attention more effectively.

The project monitoring committee

The Outaouais Environmental Campus has set up a committee to monitor the work of the Mapping Our Community Forest project and to share knowledge about the forest. The committee is made up of eight members representing the Outaouais Environmental Campus, the MRC des Collines-de-l'Outaouais and ISFORT. During meetings, committee members shared their expertise on forest-related issues. Please see the following insert for a list of committee members.

⁴ Commission régionale sur les ressources naturelles et le territoire public de l'Outaouais and Société d'histoire forestière du Québec, <http://www.histoireforestiereoutaouais.ca/>



Insert 1: Members of the Mapping our Community Forest project follow-up committee

Outaouais Environmental Campus

Éric Corneau, president and co-founder.

Christopher Minnes, vice-president and co-founder.

Christine Tremblay, Member of the Board of Directors

Shelley Crabtree, General Manager

Institute for Temperate Forest Sciences (ISFORT)

Christian Messier, professor of forest management and biodiversity at UQO and UQAM, and ISFORT researcher.

MRC des Collines-de-l'Outaouais

François Simard, geomatics technician

3. Forest characteristics in the MRC des Collines-de-l'Outaouais

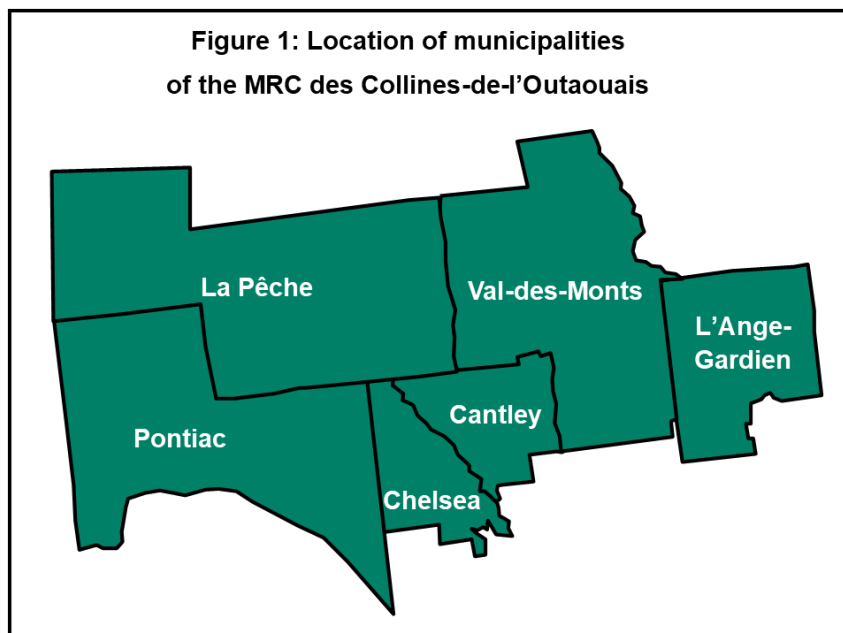
In this section, a detailed portrait of the forest in the MRC des Collines-de-l'Outaouais is offered, based on the most recent data available. The discussion begins with an overview of the MRC territory, followed by a specific examination of forests and their spatial layout. Various attributes of forest cover are highlighted, including tenures, predominant tree species, ecologically significant areas and forest stand composition.



3.1 The MRC des Collines-de-l'Outaouais territory

The MRC des Collines-de-l'Outaouais will have a population of 54,498 in 2021. Its territory covers an area of 2,078 square kilometers. It comprises six rural and semi-urban municipalities.

The population ranges from 6,102 in L'Ange-Gardien to 13,328 in Val-des-



Monts. Val-des-Monts is the most populous municipality in the Outaouais after Gatineau. Surface area varies from 121 km² for Chelsea to 616 km² for La Pêche, the latter being the largest municipality in the Outaouais. Population density ranges from 12.2 inhabitants per km² in Pontiac to 85.6 per km² in Cantley.

Table 1: Population, area and density of MRC des Collines-de-l'Outaouais municipalities

Municipality	Population (2021)	Area (ha)		Proportion (%) of MRC territory	Population density per km ²
		Hectare	km ²		
Cantley	11 449	13 383	134	6,4%	85,6
Chelsea	8 000	12 084	121	5,8%	66,2
L'Ange-Gardien	6 102	22 415	224	10,8%	27,2
La Pêche	8 636	61 642	616	29,7%	14,0
Pontiac	6 142	50 312	503	24,2%	12,2
Val-des-Monts	13 328	47 996	480	23,1%	27,8
Collines-de-l'Outaouais	53 657	207 832	2 078	100,0%	25,8

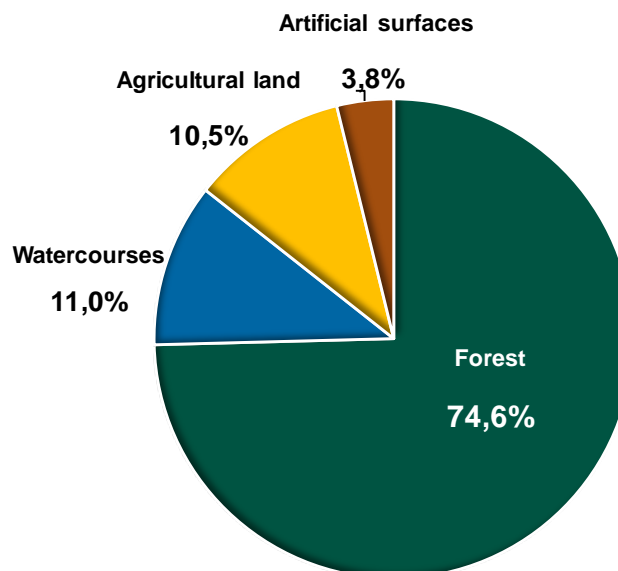
Sources: Institut de la statistique du Québec, Système sur les découpages administratifs, January 2022, and Statistics Canada. 2023. (table). Census Profile, 2021 Census of Population, Statistics Canada Catalogue no. 98-316-X2021001. Ottawa. Released March 29, 2023. Compiled by Projets Territoires.

3.1 Forest distribution

In 2014, three-quarters of the territory (74.6%) of the MRC des Collines-de-l'Outaouais was forested⁵, equivalent to an area of 1,550 km² (ISQ, 2021). For a definition of forest, please see the insert below. The MRC has a dense hydrographic network, with several water bodies and streams covering 11% of the territory⁶. These include the Outaouais, Gatineau, du Lièvre, Quyon, La Pêche and La Blanche rivers, as well as 1,079 lakes larger than one hectare (MRC des Collines, 2023). Agricultural land accounts for 10.5%.

Artificial surfaces, including areas heavily influenced by human activities such as residential areas, associated green spaces, industrial and commercial zones, transportation infrastructures and parking lots,

Figure 2: Area coverage, MRC des Collines-de-l'Outaouais, 2014



Sources: Institut de la statistique du Québec, using maps and ecoforestry data from the Ministère des Ressources naturelles et des Forêts, May 2021; and Système sur les découpages administratifs, January 2022. Compilation Projets Territoires, 2023

Table 2: Forest area by municipality, MRC des Collines-de-l'Outaouais, 2014

Municipality	Surface area (km ²)	Proportion (%)
Cantley	102,6	76,6%
Chelsea	94,4	78,2%
L'Ange-Gardien	170,2	75,9%
La Pêche	484,6	78,6%
Pontiac	312,7	62,1%
Val-des-Monts	385,7	80,4%
Collines-de-l'Outaouais	1 550,2	74,6%

Sources: Institut de la statistique du Québec, using maps and ecoforestry data from the Ministère des Ressources naturelles et des Forêts, May 2021; and Système sur les découpages administratifs, January 2022. Compilation Projets Territoires, 2023

⁵ Including forested wetlands.

⁶ Including wetlands with alders.

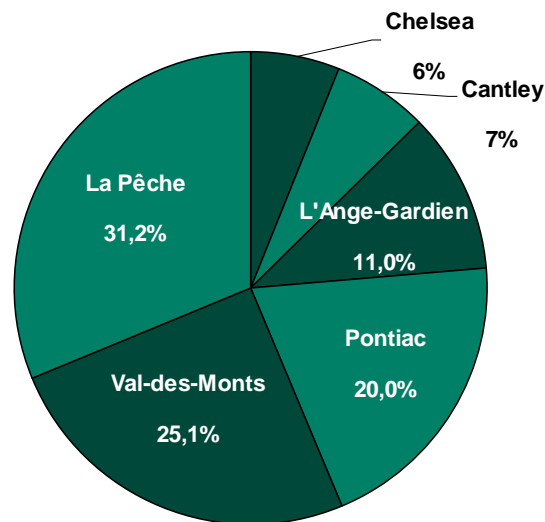


indoor agricultural production such as greenhouses, as well as resorts and leisure centers such as golf courses, occupy 3.8% of the territory.

Forest cover predominates in all MRC des Collines-de-l'Outaouais municipalities. However, it is slightly lower in the municipality of Pontiac, representing 62.1% of its territory. This can be explained by the fact that Pontiac has the highest proportion of agricultural land and water bodies, including shrub wetlands.

Given the size of La Pêche, Val-des-Monts and Pontiac, these municipalities are home to more than three-quarters of the MRC des Collines-de-l'Outaouais forest.

Figure 3: Forest distribution by municipality, MRC des Collines-de-l'Outaouais

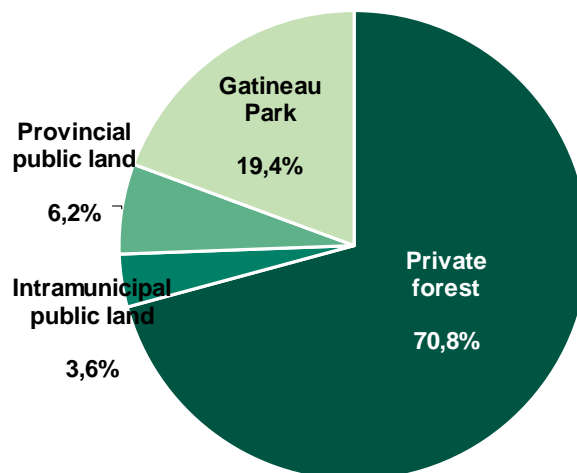


Source: MRC des Collines-de-l'Outaouais, 2017

3.2 Tenures: distribution of public and private forests

A significant proportion of the forests in the MRC des Collines-de-l'Outaouais are privately owned, representing 70.8% (107,654.2 hectares). Provincial public land covers 6.2% of the forest area (9,435.7 hectares), while intramunicipal public land (IPL) managed by the MRC represents 3.6% (5,524.2 hectares). Finally, 19.4% of the

Figure 4: Forest tenure, MRC des Collines-de-l'Outaouais



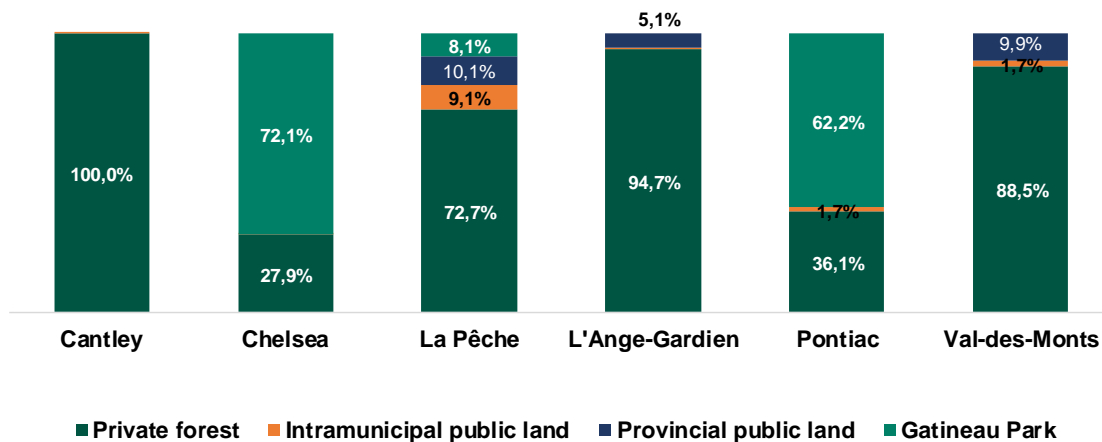
Source: MRC des Collines-de-l'Outaouais, 2017

forests (29,469.9 hectares) are part of Gatineau Park⁷, owned by the National Capital Commission (NCC).

Forest land ownership varies considerably from one municipality to another. The forest is mainly privately owned in Cantley (100%), as well as in L'Ange-Gardien (94.7%), Val-des-Monts (88.5%) and La Pêche (72.7%). On the other hand, the proportion of private forests is lower in the municipalities of Pontiac (36.1%) and Chelsea (27.9%), as a large part of their forest cover (72.1% and 62.2% respectively) belongs to Gatineau Park.

Provincial public land is mainly distributed among three municipalities: La Pêche, Val-des-Monts and L'Ange-Gardien. As for intramunicipal public lands, they are mainly present in La Pêche, with a lesser presence in the municipalities of Pontiac and Val-des-Monts.

Figure 5: Forest tenure by municipality, MRC des Collines-de-l'Outaouais, 2017



Source: MRC des Collines-de-l'Outaouais, 2017

Insert 2: Definition of forests and other land cover

Forest definition

"Forests are "ecosystems where trees predominate" (ISQ, 2023, p.15). It is "a biome based on woody individuals reaching at least five meters in height at maturity and producing at least 10% canopy cover over a minimum area of 0.5 hectare" (MFFP, 2019).

"Forest canopy refers to the view that forests offer from the air, i.e. "the more or less continuous screen of branches and foliage formed by all the tree tops in a stand" (ISQ, 2023, p.15).

⁷ 2017 data provided by the MRC des Collines-de-l'Outaouais.

Inclusion of forested wetlands

We have also included forest wetlands. "Wetlands are all sites saturated with water or flooded for a sufficiently long period to influence the nature of the soil or the composition of the vegetation". They include, among others, "marshes, swamps, peat bogs and ponds". The land accounts distinguish two categories of wetlands: "forested" and "herbaceous or shrubby". Forested wetlands are suitable for timber harvesting, unlike herbaceous or shrub wetlands (largely alder). We have grouped forested wetlands with forest and herbaceous/shrub wetlands with water bodies.

Artificial surfaces

"Artificial surfaces are environments strongly influenced by human activities due to development. These include: housing estates "and associated green spaces"; industrial and commercial zones; transportation infrastructure and parking lots; mines (including mined peat bogs); engineered landfill sites; domestic agricultural production (such as hog farms or greenhouses); resorts and leisure facilities (such as ski resorts and golf courses). Thus, although these are often surfaces where the soil is artificialized, they can also be partially vegetated" (ISQ, 2023, p.14).

Agricultural land

"Agricultural land is land used for growing crops. It includes land used for cultivation, grazing, fallow, woodlands, swamps and marshes used for agricultural production. They exclude buildings and indoor production, such as hog and poultry farms. If an agricultural production includes both buildings and pastures, outdoor areas and buildings, their respective areas will be categorized separately. For example, a dairy farm with an area devoted to growing hay and barns will include an area of agricultural land and an area of artificial surface" (ISQ, 2023, p.14).

Sources :

INSTITUT DE LA STATISTIQUE DU QUÉBEC (2023). Comptes des terres du Québec méridional. Édition 2023, [On line], Québec, L'Institut, 142 p. [On line]. [statistique.quebec.ca/en/fichier/comptes-terres-quebec-meridional-2023.pdf].

MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS (2019, updated September 25). "Forest," Forestry Glossary, [Online]. [glossaire-forestier.mffp.gouv.qc.ca/terme/410].



Private forests

A high proportion (63.4%) of the private forest area in the MRC des Collines-de-l'Outaouais is located in the municipalities of La Pêche and Val-des-Monts.

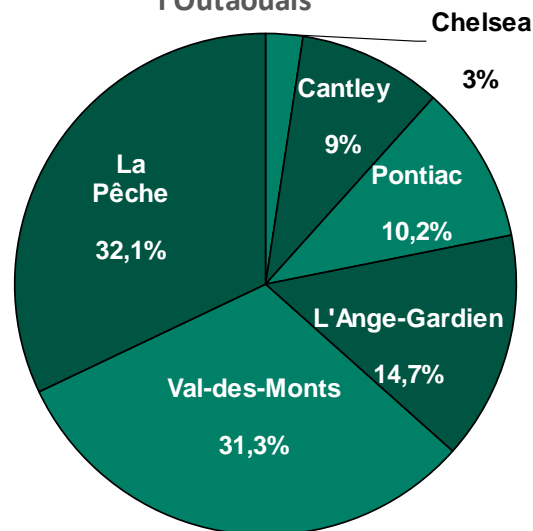
Private forests in the MRC des Collines-de-l'Outaouais are held by numerous owners. Of these, 101 are recognized as forest producers in the MRC in 2020, with a total area of 117,283 hectares. To be recognized as a forest producer means owning at least 4 hectares of forest land, having a valid forest management plan produced by a forest engineer, and holding a forest producer certificate (Agence des forêts privées de l'Outaouais, n.d., p.2). A forest management plan contributes to improving knowledge of forest composition, identifying environments to be protected and enhancing the value of the woodlot (Fédération des Producteurs forestiers du Québec, 2020).

According to the Agence des forêts privées de l'Outaouais, the number of forestry producers has changed little in recent years, and the agency even anticipates a decline, stating that "the current frenzy of the real estate market may contribute to the loss of forestry acreage, as new owners see it as an investment and a living environment rather than a tool for regional economic development and potential income" (Agence des forêts privées de l'Outaouais, n.d., p.7).

Forestry activities in private forests are generally less regulated than on public land (Duchesneau, Forget and Doyon, 2005, p.11). However, in recent decades, some municipalities have taken action by adopting tree-cutting bylaws (MRC des Collines-de-l'Outaouais, 2019, p.92). All municipalities in the MRC des Collines-de-l'Outaouais have implemented municipal bylaws governing tree cutting on their territory. Some of them have adopted very strict forest management regulations, requiring cutting permits in all cases or costly permits, and imposing other administrative constraints that can discourage timber harvesting (Agence des forêts privées de l'Outaouais, 2015a, p.16).

One of the objectives of the MRC des Collines-de-l'Outaouais, as set out in its Schéma d'aménagement et de développement, is also to "promote the harmonization of

Figure 6: Location of forests on private land, MRC des Collines-de-l'Outaouais



Source: MRC des Collines-de-l'Outaouais, 2017



municipal tree-cutting regulations throughout the MRC territory in terms of forest protection in the context of residential and commercial development projects" (MRC des Collines-de-l'Outaouais, 2019, p.99).

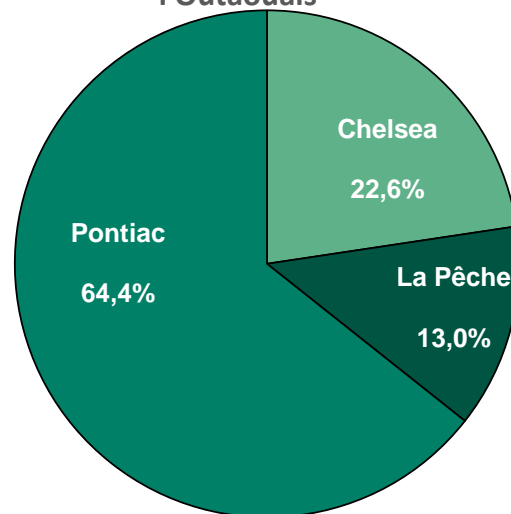
Gatineau Park

The 35,650-hectare Gatineau Park is located mainly in the MRC des Collines-de-l'Outaouais, in the municipalities of Pontiac, Chelsea and La Pêche. Occupying 17% of the territory, it represents 19.4% of the MRC des Collines-de-l'Outaouais forest. It is the largest real estate property under the responsibility of the National Capital Commission (NCC). "The Plan for Canada's Capital designates the park as a Category II Natural Heritage Area, protected and managed first and foremost for ecosystem preservation and secondarily for recreation.

Predominance is given to natural processes and the restoration of natural heritage is encouraged" (NCC, n.d.). It is also the second most visited park in Canada (ibid.).

Please see Appendix 1 for a map of Gatineau Park's environmental components.

Figure 7: Location of Gatineau Park forests, MRC des Collines-de-l'Outaouais



Source: MRC des Collines-de-l'Outaouais, 2017

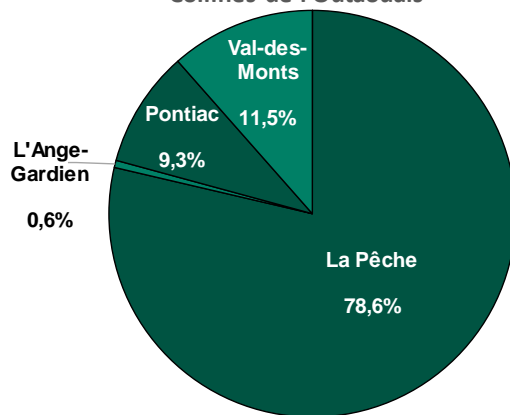
Parc du Sault-des-Chats

The Parc du Sault-des-Chats, straddling the municipality of Pontiac and the neighbouring municipality of Bristol in the MRC Pontiac, is currently at the project stage. The park's vocation will be recreation and tourism, as well as conservation of the region's ecological and historical heritage.

Public lands and intramunicipal public lands

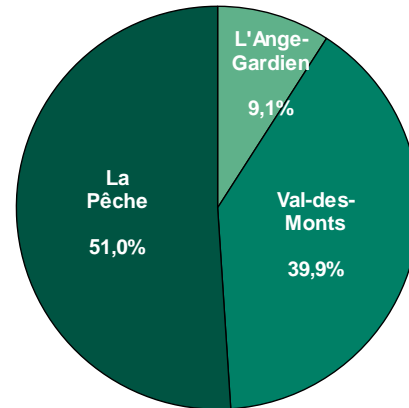
Public land and intramunicipal public land (IPL) fall under the jurisdiction of the Ministère de l'Énergie et des Ressources naturelles du Québec (MERN) and are subject to the Forest Act. However, since 2002, forest management of IPT has been the responsibility of the MRC under a specific agreement with MERN (SAD, 2019, p. 132). The MRC has "given the intramunicipal public lands of the MRC des Collines-de-l'Outaouais a mission of training, awareness and education in forest resource management with the aim of making it a financially self-sufficient driver of socioeconomic development" (MRC des Collines-de-l'Outaouais, 2019, p.92).

Figure 8: Location of forests on intramunicipal public land, MRC des Collines-de-l'Outaouais



Source: MRC des Collines-de-l'Outaouais, 2017

Figure 9: Location of forests on provincial public land, MRC des Collines-de-l'Outaouais

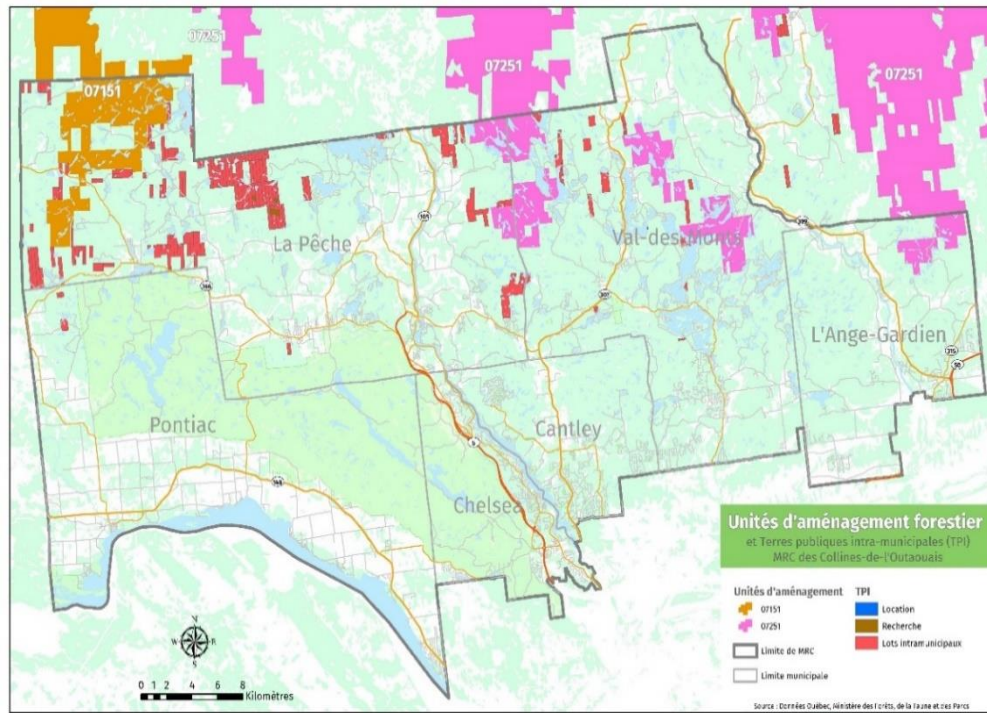


Source: MRC des Collines-de-l'Outaouais, 2017

As shown in Figure 10, IPTs are highly fragmented across the territory. They are divided into 47 blocks ranging in size from 0.5 to 311 hectares (Forget, Bouffard and Doyon, 2006), and are often enclosed by private property (NovaSylva, 2010, p. 12). The highest concentration of public land is found in the municipality of La Pêche, while smaller areas are also found in Val-des-Monts, Pontiac and L'Ange-Gardien.

"Given the region's history, the network of roads and trails, both public and private, provides access to the majority of IPTs. IPTs are used not only for forest management, but also for vacationing, hunting, fishing, hiking, ATVing, etc." (NovaSylva, 2010, p.12). Since assuming responsibility for IPT management, the MRC des Collines-de-l'Outaouais has conducted a number of studies to gain a better understanding of this territory and determine the measures required to ensure adequate protection (Duchesneau, Forget and Doyon, 2005; Forget, Bouffard and Doyon, 2006; NovaSylva, 2010).

Figure 10: Intramunicipal public lands (IPT) and public domain lands (development units), MRC des Collines-de-l'Outaouais



Source : MRC des Collines-de-l'Outaouais, 2019

Public domain lands are subdivided into management units. The southern part of planning unit 071 51 and the southwestern part of 072 51 are located north of the MRC des Collines-de-l'Outaouais, in the municipalities of La Pêche, Val-des-Monts and L'Ange-Gardien.

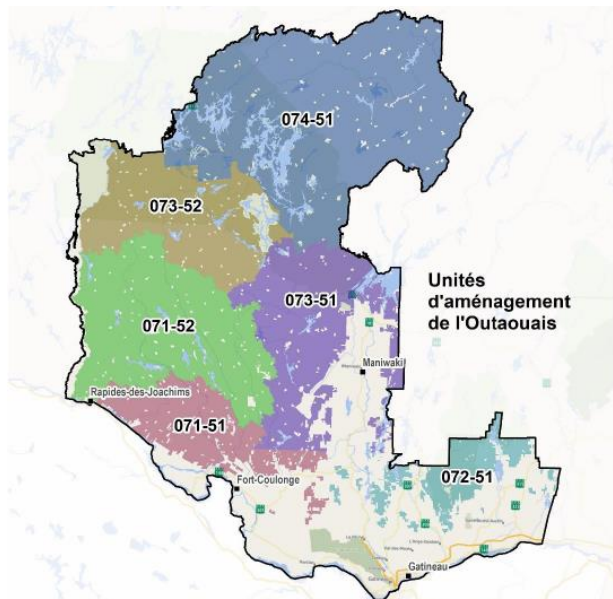
The management units have integrated operational and tactical forest management plans (PAFIO and PAFIT), as well as special management plans. "The PAFIO deals with intervention sectors where non-commercial silvicultural work, such as planting and site preparation, as well as precommercial and commercial thinning, could be carried out over the next few years" (Ministère des Ressources naturelles et des Forêts, 2023, p. 1). "[L]a table locale de gestion intégrée des ressources naturelles (TLGIRT) de l'Outaouais constitutes the forum favoured by MERN to obtain feedback from a dozen organizations and stakeholders interested in the public forest" (MRC des Collines-de-l'Outaouais, 2019, p.92).

Forestry companies have the option of harvesting timber volumes under forest management and supply agreements (FMSAs), which are based on advance planning. These plans are subject to public consultation (Ministère des Ressources naturelles et des Forêts, 2023, p. 1). "The Chief Forester is responsible for determining the allowable cut for all public lands under management in Quebec. Following this calculation, volumes are allocated to CAAF and forest management agreement (CtAF) beneficiaries. Compliance with these allocated volumes is monitored by the MRC, which holds the rights to the IPT. Since the plans were recently

updated for units 071 51 and 072 51, public consultations were held in the fall of 2022. You can consult the map showing the annual schedule of harvesting activities in the Outaouais region at the following address: <https://cartes07.maps.arcgis.com/apps/webappviewer/index.html?id=497f52524c714a7bb1a7cd2957c8ee93>

In the Outaouais region, public forests are certified. "Forest certification provides assurance that forestry practices respect the principles of sustainable development, and responds to the demand for confidence and transparency from consumers and, more generally, from all economic players" (Duchesneau, Forget and Doyon, 2005, p.2).

Figure 11: Management units in the Outaouais region



Source : Ministère des Ressources naturelles et des Forêts, 2023, p. 4.

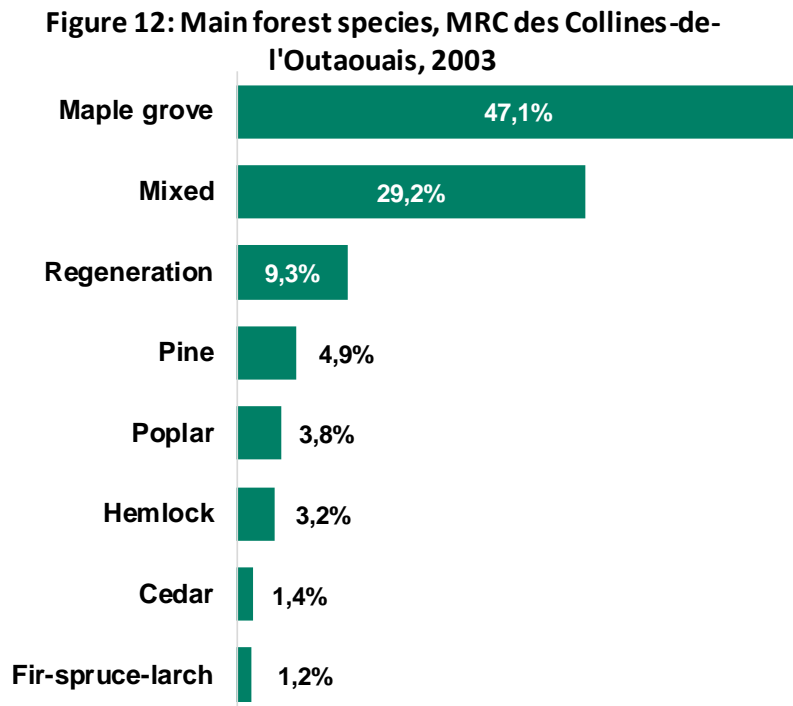
3.3 Forest species

The territory of the MRC des Collines is mainly located in the basswood maple bioclimatic zone, with the exception of the southern part of the municipality of Pontiac, which lies along the Ottawa River in the bitternut hickory maple bioclimatic zone, characterized by a milder climate. See Appendix 2 for a map of bioclimatic zones in the Outaouais region. The basswood maple zone is home to a highly diverse flora. "We estimate the number of vascular species at 1,500 [...] including 41 forest species" (Agence des forêts privées de



l'Outaouais, 2015b, p.19). The distribution of forest species across the territory is similar from one municipality to another.

Nearly half of the forests (47.1%) in the MRC des Collines-de-l'Outaouais are maple groves. These are forests where maple is the dominant species, but oak and cherry are also found. Other species such as beech, basswood or ash are also found (MRC des Collines-de-l'Outaouais, 2019). Maple groves predominate in all municipalities, with proportions ranging from 39% in the municipality of Pontiac to 56.1% in Chelsea.



Source: Schéma d'aménagement et de développement de la MRC des Collines-de-l'Outaouais, 2019

Mixed forest, which includes both hardwoods and conifers, is the second most abundant species in the MRC, accounting for 29.2% of the total forest area. This proportion ranges from 29.3% in L'Ange-Gardien to 31.6% in Pontiac. Regenerating woodlands, comprising plantations and new growth following clear-cutting in the 20 years prior to the photo being taken (in 2003), occupy third place with a proportion of 9.3%. This varies from 5.7% in Chelsea to 11% in L'Ange-Gardien.

Pine forests, mainly white pine with occasional red pine, represent the fourth most important species class in the MRC, with a proportion of 4.9%. Proportions range from 2.4% in Val-des-Monts to 12.7% in Pontiac. The latter municipality stands out for its higher proportion of pine forests.

Poplar forests, also known as aspen, account for 3.8% of forest cover. Their proportion ranges from 1.5% in Chelsea to 6.5% in L'Ange-Gardien.

A small proportion of the forest (3.2%) is dominated by hemlock. This species is less present in L'Ange-Gardien (0.5%), while it is more widespread in the municipality of Pontiac (4.4%).

Table 3: Main forest species, Collines-de-l'Outaouais MRC and municipalities, 2003

Species	MRC	Cantley	Chelsea	L'Ange-Gardien	La Pêche	Pontiac	Val-des-Monts
Maple	47,1%	51,6%	56,1%	53,2%	45,7%	39,0%	49,2%
Mixed	29,2%	31,2%	29,3%	23,9%	30,1%	31,6%	27,8%
Regeneration	9,3%	7,7%	5,7%	11,0%	10,5%	6,8%	10,5%
Pine	4,9%	5,3%	4,6%	3,5%	2,5%	12,7%	2,4%
Poplar	3,8%	1,6%	1,5%	6,5%	2,9%	3,2%	5,3%
Hemlock	3,2%	1,7%	2,5%	0,5%	3,8%	4,4%	3,1%
Cedar	1,4%	0,3%	0,1%	0,9%	2,5%	0,9%	1,1%
Fir-spruce-larch	1,2%	0,6%	0,3%	0,7%	2,1%	1,4%	0,6%

Source: Schéma d'aménagement et de développement de la MRC des Collines-de-l'Outaouais, 2019

There are very few forests composed mainly of cedar (1.4%) and spruce (1.2%). However, La Pêche stands out for its higher proportion of cedar (2.5%) and spruce (2.1%).

Butternut and cork elm are trees that are threatened, vulnerable or likely to become so, and are present on the territory (MRC des Collines-de-l'Outaouais, 2009, p.422).

Forest cover in the IPT is similar to the rest of the territory. "The IPTs are currently 59% hardwood, 33% mixed and 8% softwood" (NovaSylva, 2010, p.6). In line with study recommendations, the MRC des Collines-de-l'Outaouais aims to increase the proportion of softwood-dominated mixed stands and softwood stands, particularly white pine, which is part of the ecosystem most at risk (Forget, Bouffard and Doyon, 2006, p.17). In 2006, only 22 hectares of pure pine forest had been identified in the IPT territory (Forget, Bouffard and Doyon, 2006, p.17).

3.4 Areas of ecological interest

The MRC des Collines-de-l'Outaouais has 17 exceptional forest ecosystems on its territory, totalling 438 hectares. These include an old-growth forest, a rare forest and 15 refuge forests. These forest ecosystems are of significant ecological value and are essential to the preservation of biodiversity and natural habitats in the region.

"Rare forests are forest ecosystems that occupy a limited number of sites and cover a small area".

Old-growth forests are "stands of very old trees that have been little modified by man and natural disturbances. These forests are characterized by a combination of living, senescent and dead trees, and a soil strewn with large trunks in various stages of decomposition. There are few old-growth forests in Quebec. In the south



of the province, most forests have been considerably affected by colonization, followed by urbanization. Further north, insect epidemics and fires have made them rare.

Refuge forests "are home to one or more threatened or vulnerable plant species (including species likely to be so designated). They may include, as the case may be, a species of great rarity, at least three threatened or vulnerable species, or a remarkable population of a threatened or vulnerable species" (MRNF, 2023).

Among the forests of the MRC des Collines-de-l'Outaouais, "four are refuges of very great importance on the Quebec scale. More specifically, these are a dry cedar forest with grasses and white pine on limestone bedrock, a wet cedar forest with fir on marble, a dry cedar forest with white pine on marble, and a grouping with cork elm" (Agence des forêts privées de l'Outaouais, 2015c, p.13).

Refuge forests are mainly home to white-tailed deer and great blue heron⁸. Two large white-tailed deer confinement areas have been identified in the MRC territory: one stretching west from La Pêche to south of Kazabazua, and another located in Gatineau Park in the municipality of Pontiac, which also extends into La Pêche. In addition, there are a few areas in Val-des-Monts to the east and north of Lac Saint-Pierre, as well as a small area between La Pêche and Cantley.

There are also several heronries with a 200-metre protection strip, distributed as follows: 4 in L'Ange-Gardien, 3 in La Pêche, one in Pontiac, one in Cantley, one in Val-des-Monts and one between Val-des-Monts and Cantley. These heronries, protected by conservation strips, are important sites for nesting and maintaining Great Blue Heron populations in the region.

3.5 Forest stand demographics

In 2017, almost half of the forest cover (49%) in the MRC des Collines-de-l'Outaouais was composed of young forests aged between 20 and 79 years, and 45.9% was aged 80 years and over. Although we use the term "old-growth" to identify those aged 80 years and over, these are not old-growth forests, and many trees have not yet reached maturity. Old-

⁸ Observation based on Open Forest data: <https://www.foretouverte.gouv.qc.ca/> The Schéma d'aménagement of the MRC des Collines-de-l'Outaouais also presents maps of sites of wildlife and natural interest for each of the MRC's municipalities.

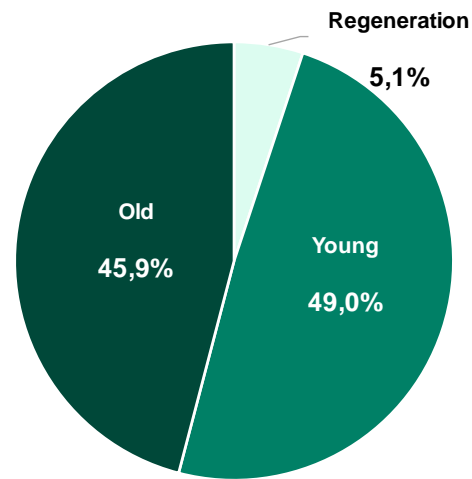


growth forests, which have not been logged, are very rare in Quebec (see section 5 on impacts).

5.1% of the forest is regenerating: these are forests that are less than 20 years old, plantations or fallow land that has been totally cut over the past twenty years.

The proportion of regenerating forest ranges from 3.9% in Val-des-Monts to 6.5% in Pontiac. Chelsea stands out for the high proportion of its forest (71.1%) aged 80 years and over. It should be noted that 72.1% of this municipality's forest is located in Gatineau Park. In other municipalities, the proportion of old-growth forest ranges from 31.5% in L'Ange-Gardien to 50.8% in Pontiac. The map on the next page illustrates the distribution of forests by age within the MRC, highlighting areas with larger areas of old-growth forest. For more details on each municipality, please consult the summaries.

Figure 13: Age of the forest in the MRC des Collines-de-l'Outaouais, 2017



Source: MRC des Collines-de-l'Outaouais, 2017

Table 4: Age of forest by tenure type, MRC des Collines-de-l'Outaouais, 2017

	Regeneration	Young	Old
Gatineau Park	1,9%	31,8%	66,3%
Intramunicipal public lands	0,8%	34,5%	64,6%
Private lands	6,5%	56,0%	37,4%
Provincial public lands	1,1%	30,7%	68,2%

Source: MRC des Collines-de-l'Outaouais, 2017

Regenerating forests are mainly found on private land (6.5%). Their proportion is low on intramunicipal public lands (0.8%), provincial public lands (1.1%) and in Gatineau Park (1.9%). On private land, we also find the highest proportion of young forests (56%) and, conversely, the lowest proportion of old-growth forests (37.4%). For other types of tenure, the proportion of old-growth forest varies between 64.6% and 68.2% (see Table 4).

The management strategy recommended by the MRC des Collines for IPT "should gradually but substantially increase the proportion of forest stands belonging to the 'old' age group over the medium term" (NovaSylva, 2010, p.8).

"Most mature forests are maple groves, which are now protected by the Commission de protection du territoire agricole du Québec" (Boulet, 2015, p.7). Indeed, in accordance

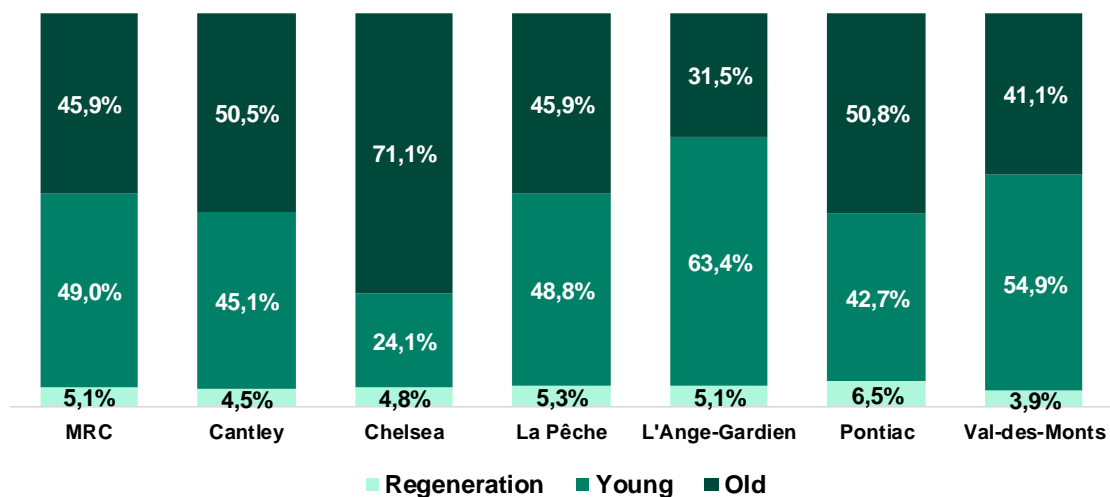


with section 27 of the Act respecting the preservation of agricultural land and agricultural activities, owners of woodlots in agricultural zones must obtain authorization from this commission to proceed with the harvesting of trees above a certain threshold in a maple grove (CPTAQ, 2023).

The MRC des Collines-de-l'Outaouais (2019) conducted an analysis of forest age by forest species, revealing several findings:

- 79.7% of maple stands are between 20 and 60 years old, while 20.3% are 60 years and older. Some maple trees are estimated to be up to 250 years old.
- As for mixed forests, 80.9% are between 20 and 60 years old, and 19.1% are over 60 years old, with some reaching 250 years.
- Some trees in pine and cedar forests can also reach 250 years of age, while hemlocks can live up to 300 years.
- Poplar forests generally don't exceed 100 years, while firs and spruces can live up to 120 years.
-

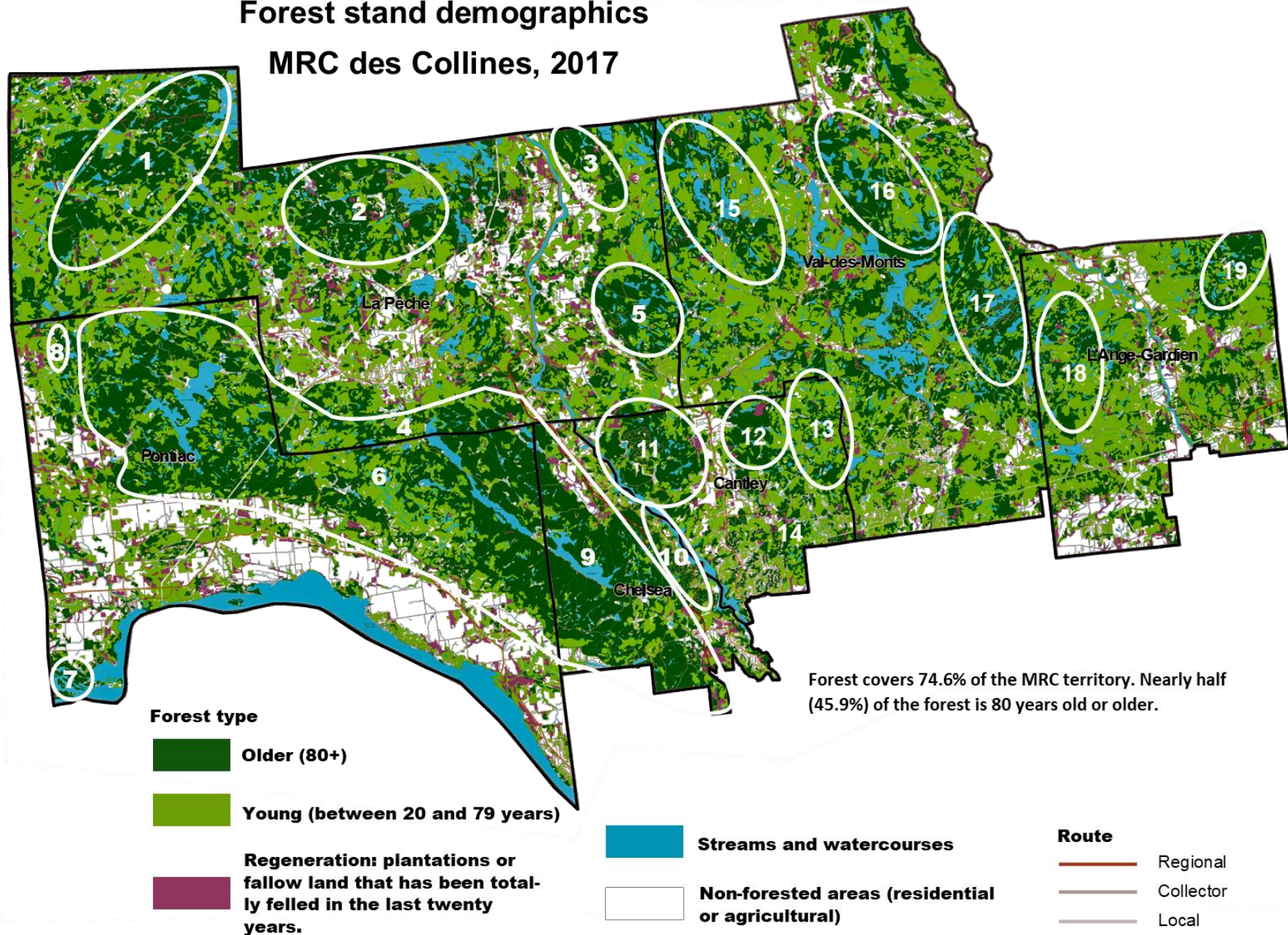
Figure 14: Age of forest in Collines-de-l'Outaouais MRC municipalities



Source: MRC des Collines-de-l'Outaouais, 2017



Forest stand demographics MRC des Collines, 2017



Source: MRC des Collines-de-l'Oustaouais, adapted by C. Doucet, for Campus environnemental de l'Oustaouais



4. Timeline: evolution of human activities and natural disturbances on the forest

Various human activities and natural phenomena have shaped the forest of the MRC des Collines-de-l'Outaouais over time. In this section, we trace a timeline based on three types of information:

- The history of forestry interventions, which have had a significant impact on the MRC forest. By examining this history, we briefly describe the changes that have occurred over time in the understanding of the forest's roles.
- We identify the main natural and man-made disturbances, such as fire, disease, natural disasters and climate change.
- Finally, we present data on the MRC's demographic evolution.

4.1 Evolution of forest management and harvesting practices and forest roles in the MRC des Collines-de-l'Outaouais

Since the 17th century, forest management and harvesting practices on the territory have certainly had the greatest impact on the state of our forests. Based on various studies (see next inset), we have identified twelve pivotal periods for forest management and harvesting in the MRC. These are summarized in Table 5.

Through this history, which summarizes interventions in the forest of the MRC des Collines-de-l'Outaouais, we can also observe a change and evolution in the understanding of the roles and importance of the forest. Figure 15 summarizes the evolution of these roles in five periods. The following text is also accompanied by inserts that summarize the changing understanding of the forest's role.³ Timeline: evolution of human activities and natural disturbances on the forest

Various human activities and natural phenomena have shaped the forest of the MRC des Collines-de-l'Outaouais over time. In this section, we trace a timeline based on three types of information:

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- Finally, we present data on the MRC's demographic evolution.

Insert 3: Sources used to reconstruct the history of logging practices in the MRC des Collines-de-l'Outaouais

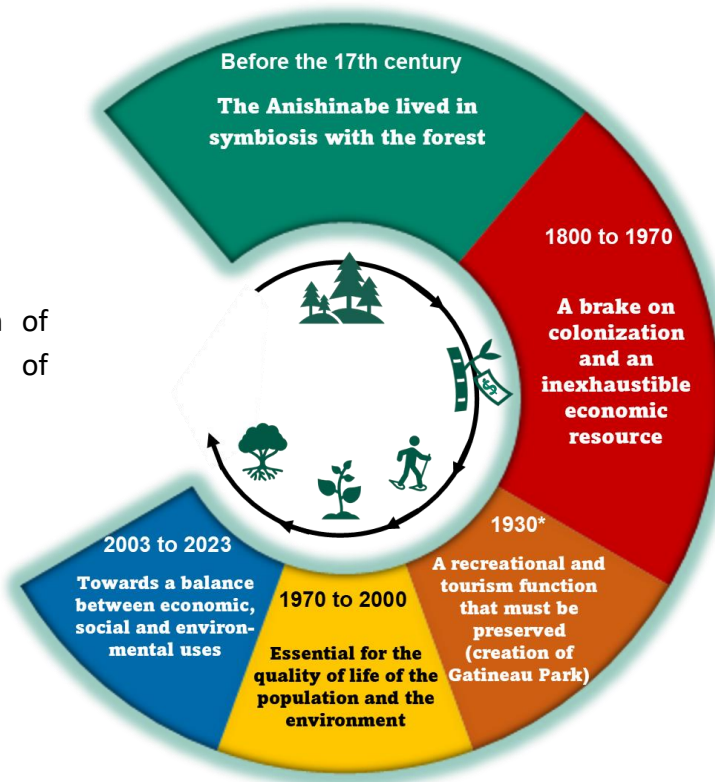
These sources include

- Research on hardwood and mixed forest conducted by the Office of the Chief Forester (Boulet, 2015; Boulet and Pin, 2015). Since most of Quebec's hardwood forest is located in the Outaouais region, this work provides a wealth of information specific to this region.
- ISFORT's work for the Commission régionale sur les ressources naturelles et le territoire public de l'Outaouais compares the distribution of forest species in the 19th century with that of 2010 (Ortuno and Doyon, 2010).
- Les capsules sur l'histoire forestière de l'Outaouais, produced by the Commission régionale sur les ressources naturelles et le territoire public de l'Outaouais in collaboration with the Société d'histoire forestière du Québec (<http://www.histoireforestiereoutaouais.ca/>).

Table 5: Evolution of logging practices

Before the 17th century	The Anishinabe lived in symbiosis with nature in the Ottawa Valley for thousands of years.
1600s and 1700s	European logging of white pine along the Ottawa River.
1800s	Colonization and start of intensive logging operations.
1796 to 1809	Privatization of part of the land.
1827 to 1850	Beginning of the forest concession system (20 in the Outaouais) with permits to cut timber on Crown land.
1825 to 1890	Beginning of pine depletion in the Outaouais, Quebec's main pine-producing region.
1909	First Forest and Timber Act, with the start of the first forest inventories.
1938	Creation of Gatineau Park as a conservation and recreational area.
1890 to 1970	Continued increase in timber harvesting, driven by demand and the mechanization of forest operations and processing.
1970 to 2001	Period of policy overhaul following popular movements to: put an end to logging on water bodies; put an end to private hunting and fishing clubs and create controlled harvesting zones to give the public access to public forest land; protect agricultural land with subdivision bylaws that allowed significant areas of forest to be preserved on private land. Improved democratization and forest management:
2002 to 2008	<ul style="list-style-type: none"> • Forest management of intramunicipal territories (TPI) is entrusted to the MRC des Collines-de-l'Outaouais. • Creation of the Commission d'étude sur la gestion de la forêt publique québécoise with several recommendations for regenerating hardwood forests.

Figure 15: Evolution of the understanding of forest roles



* Recreational tourism and forest protection were introduced earlier in the MRC des Collines-de-l'Outaouais than in other parts of Quebec.

Before the 17th century: the Anishinabe lived in symbiosis with nature

The Outaouais region has been inhabited for millennia by the Algonquin Nation, the Anishinabe, who established their traditional lands along the Ottawa River valley. Their way of life was closely tied to nature, based on hunting, fishing, gathering and trapping. This harmonious relationship with their environment was rooted in their history and culture (Lapointe, 2014a). This traditional connection with the forest, both historical and cultural, continues to this day, particularly in the region's public forests (Chapter 8, Report of the Coulombe Commission, p.237). Even today, the Outaouais region boasts a sizeable Aboriginal population.

The role of the forest
Before the 17th century, the Anishinabe lived in symbiosis with the forest, drawing their sustenance from its natural resources.



The 1600s and 1700s: exploitation of pine forests along the Ottawa River

The 1600s and 1700s were marked by the exploitation of pine forests along the Ottawa River, initiated by Europeans in the early 1600s. "The pines growing along waterways suitable for floating were so large and valuable that they were the first to disappear (Leopold 1995)" (Boulet, 2015, p.8).

The 1800s: colonization, land clearing and the start of intensive logging activities

Colonization is closely linked to logging, which began near the inhabited area (Boulet and Pin, 2015, p.3). At the time, white pine was particularly prized. "Many of the men who went up to the workcamps to work ended up settling with their families near the logging camps that gave them work. In winter they work in the lumberyards, and from spring to fall they clear and seed their land. Once they are well established, they become suppliers to the forestry companies" (Lapointe, 2014d).

Thus, "due to its geographic location, the hardwood forest has been under increased pressure since the beginning of European colonization, caused as much by land clearing for agricultural purposes as by logging" (Roy, McCullough, Forget and Doyon, 2009, p.1).

From 1796 to 1809: privatization of part of the land

Between 1796 and 1809, some 660,000 hectares (6,600 km²) of the Outaouais' most fertile farmland, belonging to the Quebec public domain, were privatized, passing into the hands of just 70 individuals (Boulet, 2015, p. 21). "Small owners will exploit, to this day, a large volume of wood in farm woodlots" (ibid.).

1827 to 1850: Beginning of the forest concession system

The timber concession system began in 1827 and lasted until 1850, when the first timber permits were issued on Crown land. "To hold a concession was to hold the right to harvest the wood growing on the concession territory, in return for the payment of premiums [...]. Revenues from these forest concessions were the most important source of tax revenue for the Quebec government in the 19th century. [...] In the Outaouais region, 20 concessionaires shared the forest resource from the public forest" (Labrecque, 2014).



1825 to 1885: Closely linked to lumbering, foundation of parishes and villages in the MRC des Collines-de-l'Outaouais⁹

The economic development of the Collines-de-l'Outaouais municipalities was largely influenced by the timber trade between 1825 and 1884. For example, the establishment of a lumberyard in Sainte-Cécile-de-Masham played a crucial role in this process. In addition, the communities of Wakefield, Perkins, Quyon, Chelsea and Cantley prospered thanks to the establishment of sawmills and wood processing plants. These developments were essential catalysts in the growth and foundation of these communities. Here are the founding dates of the MRC's various villages:

- 1825: Sainte-Cécile de Masham (municipality of La Pêche).
- 1845: Wakefield (municipality of La Pêche).
- 1845: Quyon (municipality of Pontiac).
- 1845: Perkins (municipality of Val-des-Monts).
- 1845: L'Ange-Gardien.
- 1852: Canton de Aldefield and Lac-des-Loups (municipality of La Pêche).
- 1854: Chelsea.
- 1857: Cantley.
- 1859: Alcove (municipality of La Pêche).
- 1872: Farrelton (La Pêche).
- 1875: Wilson's Corners (municipality of Val-des-Monts).
- 1881: Poltimore (municipality of Val-des-Monts)
- 1884: Luskville (Municipality of Pontiac)

⁹ Three main sources were consulted to identify when villages were founded: first, the opening of post offices in the territory, a crucial clue used by historians to trace the movement of populations (Lapointe, 2014e). Next, the Histoire-du-quebec.ca website, which offers a detailed history of many villages across Quebec. Finally, the official websites of municipalities, which often provide a summary of key moments in their history.



From 1840 to 1890: depletion of large pines in the Outaouais, Quebec's main pine-producing region

During the 1840s, pine was mainly harvested in the southern Outaouais region. With the gradual depletion of pine, logging began further north in the region in the 1870s. "So, roughly speaking, we can estimate that it took only 30 years for logging to spread throughout the Outaouais, from south to north, between 1870 and the end of the century" (Ortuno and Doyon, 2010, p.75 and 76).

The role of the forest

From 1800 to 1970, the forest was considered a hindrance to settlement and an inexhaustible economic resource. Cut and move" was the motto. It was 'the era of the quickly cut down, quickly gone' (Leopold 1995, p. 151)" (Boulet, 2015, p.12).

During this period, squared timber was exported to Great Britain, while sawn lumber was destined for the United States. In 1878, 80% of squared timber exported to Great Britain came from the Ottawa River valley (Boulet, 2015, p.12). Squared timber was transported by cages and rafts on the Ottawa River. "The Outaouais region seems to have supplied the bulk of white pine lumber between 1844 and 1852 (McCalla 1987). This trade is said to have peaked in 1864 with the shipment of nearly 700,000 m³ (Aird 1986). Such were the shipments of pine to Great Britain that the exploitation of our stands left enormous quantities of waste and residue in the forest (Minville et al. 1944)" (Boulet, 2015, p.12).

1909: First Wood and Forest Act, with the start of the first forest inventories

In the early 20th century, the government introduced the first Forest Management Act. This law required forest operators to provide certain information to government authorities. The first forest inventories began in 1915 (Boulet, 2015, p.16). "It wasn't until 1926 that Quebec, like Ontario, adopted regulations imposing stumpage fees, which were paid into the government's consolidated revenue fund, without, however, bothering to re-inject any of it into forest renewal, the main source of wealth at the time (Mackay 1987)" (Boulet, 2015, p.16).



1938: Creation of Gatineau Park as a conservation and recreational area

In 1938 and 1949, the federal government acquired parcels of land in the Collines-de-l'Outaouais for conversion into a conservation and recreation area (NCC, n.d.). "The vision of a landscape of devastated forests was, in fact, one of the reasons behind the creation of Gatineau Park in the mid-twentieth century" (MRC des Collines-de-l'Outaouais, 2019, p. 90).

Role of the forest

From 1930 to 1940, the forest also played a recreational and tourism role in the MRC des Collines-de-l'Outaouais, highlighting the importance of its conservation. Indeed, as early as 1930, issues related to the forest's various roles began to emerge. "The cutting and sale of firewood, in particular, came into conflict with the recreational values of the region's vacationers" (NCC, n.d.). Villages such as Alcove, Canton de Aldefield and Lac-des-Loups were also popular tourist and vacation destinations (Histoire-du-quebec.ca, 2023). It was at this time that Gatineau Park was created. Thus, the rise of recreational tourism and the issue of forest protection emerged earlier in the MRC des Collines-de-l'Outaouais than in other areas of Quebec.

From 1890 to 1970: steady growth in demand and timber harvesting, with mechanization of forestry operations and transformation processes

The pulp and paper industry began to develop in the 1890s. The demand for lumber and pulpwood increased significantly during the First World War (Boulet, 2015, p.16). In the 1920s, this trend was reinforced:

"Regenerating woodlands, including plantations and new regrowth after clear-cutting carried out in the 20 years prior to the photo being taken (in 2003), occupy third place with a proportion of 9.3%. Harvesting operations there accounted for almost 59% of the total area cut in the province, with no less than 98% of the volume harvested in pine, oak and walnut, 95% in hardwoods for sawmills (group 3) and 53% in species used mainly for pulp and paper (group 4) (MTF 1923). Much of the wood cut was destined for the export market, especially pulp and paper" (Boulet, 2015, p.20).

It was also in the 1920s that The James MacLaren Co. Ltd "began logging hardwoods (especially yellow birch) in the Lièvre River basin in the Outaouais region, harvesting only high-quality, large-diameter stems over one hundred and twenty years old. Yellow birch,



basswood, white ash, late cherry, red oak and sugar maple were the most sought-after species (MTF 1928)" (Boulet, 2015, p.18). In the 1950s, yellow birch harvesting intensified.

Starting in the 1940s and in the decades that followed, improvements to the transportation network and the mechanization of forest operations and processing intensified logging (Boulet and Pin, 2015, p.12).

The softwood lumber industry, particularly spruce and fir, experienced a major boom from 1960 onwards. Elm and beech were also used as secondary species (Boulet, 2015, p.33).

Following the first forest inventories, in addition to white pine, the State forecast medium-term stockouts for yellow birch for the next 40 years, as well as for quality lumber, oak, walnut and red pine (Boulet, 2015, p.35 and p.38).

1970 to 2001: A period of policy review following popular movements

In the 1970s, concerns about forest management multiplied, amplified by growing demands for environmental protection and increased access to land and wildlife. This period saw the start of a policy overhaul, aimed at getting the state back in charge of managing and controlling forest resources, while offering greater access to the population. "From 1970 to 2013, in fact, the Quebec government carried out a complete overhaul of the forest concession regime, gradually reducing the role played by private companies in the management and use of the public forest" (Lapointe, 2014c).

The role of the forest

From 1970 to 2001, popular pressure emerged to denounce harmful practices having a major impact on the forest. The forest was no longer perceived solely as an economic resource, but was also recognized as essential to the population's quality of life and the preservation of the environment.

In 1971, the state adopted a genuine forestry policy for the first time (Boulet, 2015, p.37).

In the 1970s, timber was still floated on waterways in the Outaouais and Quebec to transport the resource. However, several groups, such as environmentalists, biologists, boaters and fishermen, rallied to denounce the practice because of its many ecological impacts (Lapointe, 2014f). In response to these concerns, the government introduced more restrictive regulations, leading to the gradual abandonment of the practice by several companies in the late 1970s. However, this abandonment was later in the Outaouais: "The 'Upper Ottawa Improvement Company' (ICO), which managed the log drive on the Ottawa River, ended its activities around 1992, while the James MacLaren company imitated its action on the Lièvre River around 1993" (Lapointe, 2014f).

The first popular movements linked to natural resources focused on restricted access to public forest territory (Labrecque, 2014a). At the time, private hunting and fishing clubs were established within forest concessions. However, only the members of these clubs, the majority of whom were foreigners, benefited from these resources. The Loi sur la conservation de la faune, passed in 1978, "put an end to private clubs and created controlled harvesting zones (Zec), within the former territories of private clubs" (Labrecque, 2014a).

Although the adoption of the Loi sur la protection du territoire agricole (Agricultural Land Protection Act) in 1978 aimed to protect zoned land suitable for agricultural activities, regulations limiting the division of land into small parcels and their subdivision have contributed to preserving large areas of forest on private land. Indeed, much of the agricultural zone is wooded. Moreover, owners of woodlands in agricultural zones must obtain authorization from this commission to harvest trees above a certain threshold in a maple grove (CPTAQ, n.d.).

In the 1980s, more and more organizations called for greater preservation of environmental quality and protection of natural resources, as well as better management (Labrecque, 2014a).

In 1984, public consultations were held to redefine the forestry regime, culminating in the adoption of a new Forest Act in 1987.

"This law now provides for a new method of allocating timber in the form of a Timber Supply and Forest Management Agreement (TSFMA). Nearly 300 TSFMAs have been signed with industrial foresters. A TSFMA grants an industrial forestry firm the right to obtain an annual cutting permit to harvest a specific volume of wood from a well-defined forest area. It is also responsible for managing the forest on this territory, in collaboration with other forestry companies. Environmental protection standards (Règlement sur les normes d'intervention dans les forêts du domaine de l'État) that apply to harvesting and road construction have become much stricter" (Labrecque, 2014).

In 1996, a regional agency for the development of private forests was created in each region, responsible for administering the Programme d'aide à la mise en valeur des forêts privées on their territory.

From 1970 to 2001, popular pressure emerged to denounce harmful practices that had a major impact on the forest. The forest was no longer perceived solely as an economic resource, but was also recognized as essential to the population's quality of life and the preservation of the environment.



2002: Forest management of intramunicipal public lands (IPTs) is entrusted to the MRC des Collines-de-l'Outaouais

Since 2002, forest management of IPTs has been the responsibility of the MRC under a specific agreement with MERN (SAD, 2019, p.132). Please refer to section 3.2 on tenures for more information on IPTs.

2003: Creation of the Commission d'étude sur la gestion de la forêt publique québécoise, which issues several recommendations aimed at regenerating hardwood forests.

The release of the film "L'erreur boréale" in 1999 prompts the government to re-examine forest management to make it more democratic (Labrecque, 2014a). At the same time, the hardwood industry was also experiencing an unprecedented crisis, making the implementation of integrated harvesting more difficult than expected.

The Commission d'étude sur la gestion de la forêt publique québécoise was created in 2003 to examine the management of publicly owned forests. The report, published in December 2004, is accompanied by a series of recommendations, some of which are specific to the management of hardwood forests, which, it should be recalled, predominate in the Collines-de-l'Outaouais MRC.

"That the Ministry implement a vast hardwood forest 'rehabilitation' [restoration] program with treatments based on scientific studies, maintain 'control' [monitoring] measures adapted to the carrying out of selection cuts, aim to achieve full afforestation [adequate regeneration in desired species], find [new] outlets for lower-quality wood and draw up a 'portrait' of the hardwood forest as a whole by species and quality" (Commission Coulombe 2004, section 6. 6 quoted by Boulet, 2015, p.51).

2008: The Table régionale de gestion intégrée des ressources et du territoire de l'Outaouais is created

As recommended in the Coulombe report, a Regional Commission on Natural Resources and Territory was created in each region¹⁰ with the aim of increasing the participation of local and regional players in the planning and management of the forest environment.

¹⁰ For more information, see the work of Guy Chiasson, in particular the following reference:

Chiasson, G., Mévellec, A., Bouthillier, L. & Boucher, J. (2020). Gouvernance forestière et changement d'échelle: le rôle ambigu de l'État dans la mise en place d'instances régionales. *Revue Gouvernance / Governance Review*, 17(2), 30-51. <https://doi.org/10.7202/1073110ar>

Today, this commission, known as the Table régionale de gestion intégrée des ressources et du territoire de l'Outaouais, brings together some twenty partners representing the various sectors of activity and interest on public land. Through a collaborative process, these partners contribute to "the planning and implementation of integrated forest management" (Table régionale de gestion intégrée des ressources et du territoire de l'Outaouais, n.d.).

Forest roles

Since the Coulombe Commission in 2003, various measures have been taken to promote integrated natural resource management, with the aim of achieving a balance between the economic, social and environmental uses of the forest. The MRC des Collines-de-l'Outaouais' land use and development plan summarizes the various functions and expectations of the forest.

According to the schéma d'aménagement, the forest offers a multitude of benefits to the population. It is an environment that promotes air and water quality, a source of economic activity generating a variety of jobs, a place conducive to recreation and education, and a nourishing landscape for the mind. What's more, it harbors incalculable biodiversity, making it home to many living creatures. However, each individual's perception of the forest varies.

With this in mind, the 8th orientation of the MRC des Collines-de-l'Outaouais land use and development plan aims to "Tendre vers une utilisation rationnelle et harmonieuse de la ressource forestière" (MRC des Collines-de-l'Outaouais, 2019, p.99).

4.2 Evolution of natural and anthropogenic disturbances

Research by Christian Messier and other scientists (Messier et *al.*, 2019) has highlighted the growing risk of Quebec forests being affected by insect epidemics, partly because of climate change. These epidemics can have devastating effects on various tree species, potentially altering the structure and composition of forest ecosystems. Understanding these risks is important for sustainable forest management and the implementation of adaptation and mitigation measures.



In this section, we have identified the main natural and anthropogenic disturbances that have had a significant impact on forests in recent centuries, drawing on a variety of sources.

Between 1800 and 1925: large tracts of forest devastated by fire

During the period of colonization, vast tracts of forest were ravaged by fire (Ortuno and Doyon, 2010, p.76) "[At] that time, fires destroyed more wood than the volume generated by logging (Langelier *op. cit.*)" (Boulet, 2015, p.13).

"In 1923, some 1,200,000 hectares of forest fell prey to flames throughout Quebec, and the Outaouais region was not spared. In the 20th century, this would be the largest area burned in Quebec in a single summer" (Blanchet, 2014). Major fire prevention measures were subsequently put in place. Note that "the first forest protection network was firmly established in the Outaouais region in 1894, and a few years later in northern Montreal and the Saint-Maurice River basin (Blanchet *op. cit.*)" (Boulet, 2015, p.14).

1940s: Dutch elm disease

"The Dutch elm disease accidentally introduced in the 1940s decimated the large elms of the hardwood forest, and to some extent favored red and sugar maples" (Allard and Gauthier 2009; Doyon and Bouffard 2009b)" (Boulet, 2015, p.43).

1940-1950: birch dieback wave

The "birch dieback [...] swept from east to west, [...] affecting paper birch and, to a lesser extent, yellow birch (Martineau 1948; Lortie 1979)" (Boulet, 2015, p.28). This dieback can be linked to various factors such as sudden temperature variations, lack of precipitation, insects, etc.

In the 1980s: acid rain

Acid rain damages fragile ecosystems. "Acid rain and its effects on maple crown dieback were the major ecological problem of the 1980s" (Boulet, 2015, p.43).

Early 1990: larch sawfly

Episodes of sawfly epidemics affected tamarack. "The decline in larch favored fir, especially in western Quebec, where the recurrence of epidemics was higher than elsewhere (MRN 2013a)" (Boulet and Pin, 2015, p.10).

1998: the ice storm affected birch and beech trees

The 1998 ice storm did damage to private forests south of the MRC. "Paper birch, yellow birch and American beech were the most sensitive and hardest-hit species (Boulet et al. 2000; Shortle et al. 2014)(Boulet, 2015).

1909, 1938, 1967, 1992 and today: spruce budworm (SBW) epidemics

Spruce budworm epidemics have been documented as far back as the 20th century, although they have been present since the end of the last ice age (Boulet and Pin, 2015, p.10). This caterpillar feeds mainly on the foliage of balsam fir and white spruce, and to a lesser extent on red and black spruce (MRNF, 2023). "The TBE epidemic of 1967 to 1992 is certainly the most severe and best documented in Quebec; it spread throughout the balsam fir distribution area" (Boulet and Pin, 2015, p.10).

A spruce budworm epidemic has been raging in Quebec since 2018. According to recent data from the Ministère des Ressources naturelles et des Forêts, in the Outaouais region, 10,460 km² are affected by this infestation (MRNF, 2023). The areas affected are mainly outside the MRC des Collines-de-l'Outaouais, in the north-west of the region, where conifers are more numerous. Trees show varying degrees of defoliation (Ministère des Ressources naturelles et des Forêts, 2023a, p.23), and the infestation is expected to continue in the coming years. Measures have been taken to limit the negative effects of this infestation.

Since 1998: Beech cortical disease

"This exotic insect, which colonizes exclusively beech trees, causes multiple microscopic wounds by feeding directly on the bark. [...] This disease has considerable consequences for American beech and, consequently, for forest stand dynamics" (Ministère des Ressources naturelles et des Forêts, 2023a, p.25).

Since 2013: The emerald ash borer problem

This insect attacks only ash trees, causing the tree to die within a few years. To curb this epidemic, the City of Gatineau, a neighbor of the MRC des Collines-de-l'Outaouais, took drastic measures by felling all ash trees on its territory in 2018 (Pineda, 2018).

Now and in the future: global warming

One of the major impacts on forests in the coming decades will be associated with climate change, the effects of which have already begun. We summarize these effects in section 5 on impacts.

4.3 Population and housing trends in the area

One of the major changes affecting the maintenance of forest cover is population growth, which often leads to the construction of housing and new infrastructure, such as roads. While the most drastic changes occurred during the initial colonization of the territory, today's continuing population growth also puts pressure on woodlands. So, to better understand this trend and its potential impact on the forest, we present in this section some data on the MRC's population growth over the years.

Over the past 25 years (1996 to 2021), the population of the MRC des Collines-de-l'Outaouais has increased by 62.6%, from 33,002 in 1996 to 53,657 in 2021 (see Table 6). This significant demographic increase was observed in all municipalities, with variations ranging from 30.1% in Pontiac to 110.3% in Cantley.

Like the population, the number of housing units also increased significantly in all municipalities (see figure 16). In 2021, the MRC had 24,627 dwellings, compared with 16,961 in 2001.

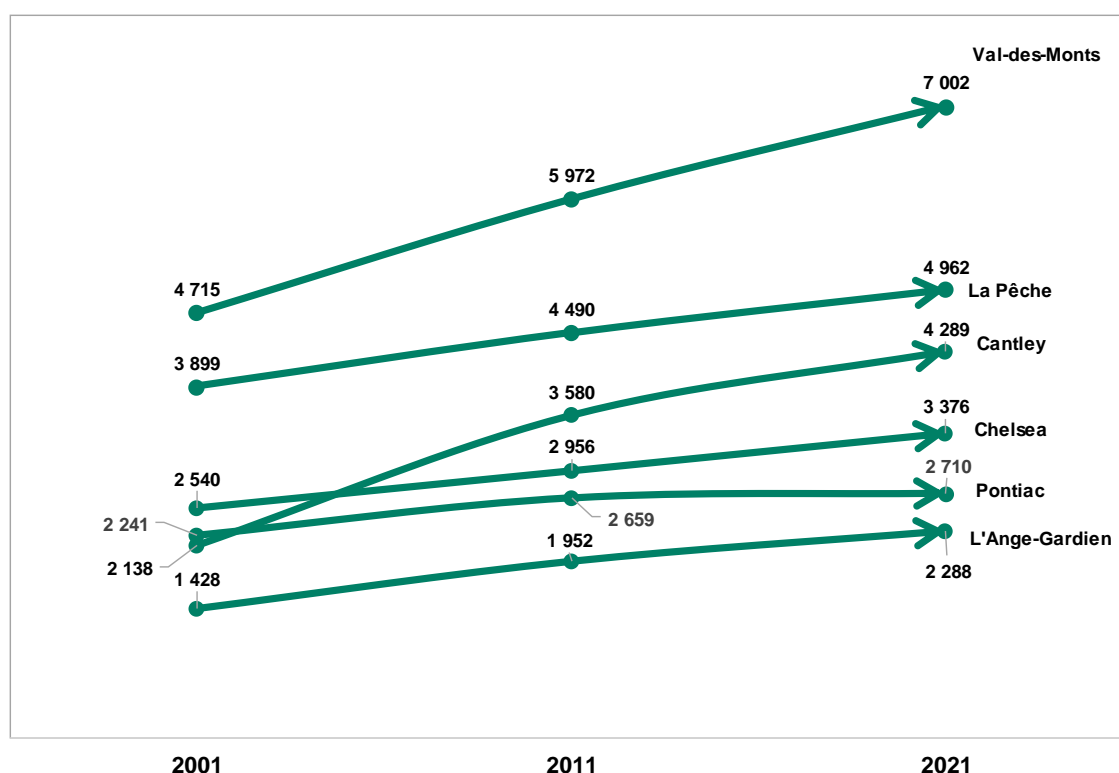
Table 6: Population trends by municipality, MRC des Collines-de-l'Outaouais, 1996 to 2021

	Number of residents			Evolution	
	1996	2016	2021	1996 to 2021	2016 to 2021
Val-des-Monts	7 231	11 582	13 328	84,3%	15,1%
Cantley	5 443	10 699	11 449	110,3%	7,0%
La Pêche	6 160	7 863	8 636	40,2%	9,8%
Chelsea	5 925	6 909	8 000	35,0%	15,8%
Pontiac	4 722	5 850	6 142	30,1%	5,0%
L'Ange-Gardien	3 521	5 464	6 102	73,3%	11,7%
MRC des Collines-de-l'Outaouais	33 002	48 367	53 657	62,6%	10,9%

Source: Statistics Canada. 2023. (table). Census Profile, 1996, 2016 and 2021 Census of Population, Statistics Canada Catalogue no. 98-316-X2021001. Ottawa. Released March 29, 2023. <https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=F> (accessed August 6, 2023). Data compiled by Projets Territoires.



Figure 16: Number of dwellings by municipality, MRC des Collines-de-l'Outaouais, 2001 to 2021



Note: According to Statistics Canada, a private dwelling is "a separate set of living quarters with a private entrance either from outside the building, or from a common hall, foyer, vestibule or stairway inside the building. It must be possible to use the entrance to the dwelling without passing through the living quarters of another person or group of people".

Statistics Canada. 2023. (table). Census Profile, 2001, 2011 and 2021 Census of Population, Statistics Canada Catalogue no. 98-316-X2021001. Ottawa. Released March 29, 2023. <https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=F> (accessed August 6, 2023). Data compiled by Projets Territoires.

5. Impacts of human and natural disturbances on forest cover

Successive forestry practices and natural disturbances since 1800, as well as population growth, have had significant impacts on the forest cover of the MRC des Collines-de-l'Outaouais. We summarize the main impacts in this section, beginning with the main changes in forest cover. We then present evidence of changes in forest cover area between 1990 and 2014. Finally, we conclude with the potential impacts of climate change on forests.



5.1 Main changes in forest cover

This section describes the impact of human and natural disturbances on forest cover in the MRC des Collines-de-l'Outaouais. It is based on several studies¹¹, including :

- The study "Estimation de la distribution des essences forestières au 19^e siècle dans l'Outaouais à l'aide des carnets d'arpentage des limites des concessions forestières. Comparaison de la composition forestière du 19^e siècle avec l'actuelle" by Ortuno and Doyon (2010) of the Institut québécois d'Aménagement de la Forêt feuillue, Ripon.
- "Le portrait de la forêt feuillue et mixte à feuillus durs au Québec : survol historique" (Boulet, 2015) as well as "Le portrait de la forêt feuillue et mixte à feuillus durs au Québec - Les perturbations et leur effet sur la dynamique forestière" produced by the Office of the Chief Forester in 2015 (Boulet and Pin, 2015).
- Several studies have also been commissioned by the MRC to better understand the IPT (Intramunicipal Public Lands) territory and guide actions to be taken:
 - The work of ISFORT researchers led to the study entitled "Identification et modalités d'intervention dans les forêts à haute valeur pour la conservation des TPI de la MRC des Collines-de-l'Outaouais", carried out by Forget, Bouffard and Doyon in 2006.
 - NovaSylva's work in 2010 resulted in the FSC (Forest Stewardship Council) Management Plan for Intramunicipal Public Lands, in compliance with the Great Lakes-St. Lawrence standard.

Forest stand structures and ages have been altered in various ways over time (Boulet, 2015, p.43).

The disappearance of old-growth forests and the degradation of biodiversity

Among the major impacts of forestry practices is the disappearance of old-growth forests (Roy, McCullough, Forget and Doyon, 2009). "In fact, Canada ranks 3^e in the world for the

¹¹ However, several studies point out that the results must be interpreted with caution: "In deciduous forests, it is not easy, if not impossible, to delimit areas that have been disturbed for a long time, and even more difficult to trace the evolution of stands since the original disturbance [...]. Traces fade over time, especially if other events have occurred over the decades, constantly modifying the forest profile. Vegetation alone is therefore not a reliable indicator for identifying the causes of changes that have taken place in forests" (Boulet and Pin, 2015, p.6).



loss of its intact forests. An inglorious ranking" (Martin and Fenton, 2023). There is growing recognition of the importance of these old-growth forests, which are home to a particularly rich biodiversity and provide a habitat sought after by many species. Several recent studies have demonstrated that protecting old-growth forests is essential for preserving ecosystems and the species that depend on them (Gravel, 2022; Martin and Fenton, 2023; Paré, 2022; Roy, McCullough, Forget and Doyon). "By replacing old-growth forests with younger forests that will not be allowed to age, we are degrading forest habitats" (Martin and Fenton, 2023).

Decrease in stand density and the phenomenon of land enclosure

Stand density is also declining, leading to forest transformation and loss of biodiversity (NovaSylva, 2010).

Logging activities have also led to a transition from softwood-dominated stands to mixed and then hardwood stands. This phenomenon is known as "leafing out".

This problem was already identified in the 1950s, when "the fine stands of white pine in the south of the Pontiac-Gatineau economic unit [including the basins of the Gatineau, La Lièvre and Blanche rivers] had given way to mixed forest and tolerant hardwood stands whose dominant species was sometimes sugar maple, sometimes yellow birch (Minville et al. 1944)" (Boulet, 2015, p.29).

A phenomenon of territory enfeuillement



1800 to 1900: the forest was predominantly coniferous.
White pine, red spruce, white spruce and balsam fir were abundant.



Around 1950-1970: decline in softwood stands and increase in mixed forests.



Since 1970: increase in hardwoods such as sugar maple, white birch, beech, ironwood, red oak, basswood, silver maple, ash and poplar.



More specifically, there has been a reduction in :

- Softwood cover, with a significant loss of white pines. "Pines are unique in being the only softwood genus to show very sharp and widespread declines, both in frequency and abundance. This demonstrates that it was one of the most heavily cut species in the Outaouais" (Ortuno and Doyon, 2010, p.77). The main causes of this decline are:
 - selective cutting of mature pines, which emptied the forests of seed trees (Quenneville and Thériault 2001; Thompson et al. 2006),
 - the lack of silvicultural treatments to regenerate white pine [...],
 - fires in the late 19th and early 20th centuries, which would have eliminated potential seed trees that were too young to withstand the flames,
 - the systematic suppression of fire in the 20th century, a disturbance that favoured the establishment of white pine (Quenneville and Thériault 2001), and
 - the absence of non-commercial treatments to ensure the survival and volume gain of young pines" (Ortuno, Doyon and Jean, 2010, p.64).

"[I]t is not so much the harvesting of mature white pines that has led to the current situation, but rather the lack of forest management, caused by a lack of understanding of the environment and poor silvicultural and ecological knowledge to predict the impact that harvesting activities would have in future pine stocks" (Ortuno, Doyon and Jean, 2010, p.64).

- Balsam fir and spruce (Ortuno and Doyon, 2010, p.83). "The spruce budworm epidemic of the early 1970s resulted in a 30% decrease in softwood cover and a 20% decrease in mixed cover in favor of hardwood cover" (Ministère des Ressources naturelles, de la Faune et des Parcs, 2004, p.16).
- Yellow birch and rarefaction of noble species, such as hickory, ash, oak, elm and butternut (Boulet, 2015, p.24 and p.71).
- Cedar (thuja), especially in the south of the MRC: "While eastern white cedar frequency and abundance have decreased in the south, they have increased in the north. This may be due to the fact that this species was not harvested for pulp and paper, but was sought after in the south, close to inhabited areas, for the manufacture of shingles and fences" (Ortuno and Doyon, 2010, p.77).

At the same time, there has been an increase in:

- Sugar maples, red maples and tolerant hardwoods¹² (Boulet, 2015, p.24).
- The presence of a transitional forest with undesirable species such as poplar, white birch and cherry. The expansion of these species has been encouraged by the opening of the canopy caused by partial cutting since the 1970s (Boulet, 2015, p.54; Ministère des Ressources naturelles, de la Faune et des Parcs, 2004, p.16; Ortuno and Doyon, 2010, p.82).
- The presence of American beech, whose abundance began to increase in the early 1970s. "Today, an estimated 63% of Outaouais maple stands are in the process of being invaded by American beech (Doyon 2003)" (Boulet, 2015, p.24)¹³.

Fragmentation of forest cover

Although the MRC des Collines-de-l'Outaouais benefits from significant forest cover, there has been an increase in forest fragmentation due to the following activities: logging, fires, residential development, vacationing, road and path construction, and the installation of transmission and power lines. "Fragmentation is defined as the fragmentation of a territory. The process of fragmenting a territory is initiated by the formation of 'gaps' that perforate the habitat" (CREDDO, 2022, p.39).

Forest fragmentation has harmful consequences for many species that depend on a vast expanse of territory for their survival. It reduces connectivity between forest habitats, leading to a decline in biodiversity. Indeed, this fragmentation has "a direct impact on the survival of certain species if alternative habitats are not available nearby" (Forget, Bouffard and Doyon, 2006, p.19).

In a study commissioned by the MRC des Collines-de-l'Outaouais in 2006, Forget, Bouffard and Doyon identified a dozen small island fragments in the Territoires publics intramunicipaux, requiring special attention. Although this analysis has not been carried out for forests on private land, observation of the maps suggests a greater frequency of cutting and development such as roads, suggesting increased forest fragmentation in some areas.

¹² Tolerant: having a tolerance for low-light conditions, allowing them to grow in the shade under mature trees.

¹³ See the work of Doyon (2003) and Audrey Maheu, a researcher at the Institut des sciences de la forêt tempérée (ISFORT) who is currently working on this issue.



Connectivity between older forests, now forming small clusters separated from each other, has also been compromised, leading to survival challenges for many species (Martin and Fenton, 2023).

5.2 Changes in forest cover from 1990 to 2014

In this section, we examine the evolution of forest cover for two recent periods: 1990 to 2003 and 2003 to 2014. The data used come from the land accounts for southern Quebec, produced by the Institut de la statistique du Québec. These accounts provide information on land area according to different types of land cover, such as artificial surfaces, agricultural land, wetlands and forests, in both the 1990s and the 2000s. In addition, they allow us to quantify the area where changes in cover have taken place between these two decades (Uhde and Keith, 2018). It should be noted that although land cover changes are measured as reliably as possible, data for small areas should be interpreted with caution. For a visual comparison of data for 1990, 2003 and 2014 in the MRC des Collines, please refer to Appendix 3.

From 1990 to 2003

Between 1990 and 2003, forest cover¹⁴ grew by 1.3% in the MRC des Collines-de-l'Outaouais, equivalent to an increase of 19.8 km². This expansion was achieved at the expense of agricultural land¹⁵, which was abandoned and invaded by forest vegetation. In fact, 33.6 km² of land previously dedicated to agriculture in 1990 became forest in 2003.

Agricultural abandonment has played a key role in maintaining the MRC's relatively stable forest area. Between 1990 and 2003, a total of 4.98 km² of forest was lost to artificial surfaces such as residential, industrial and commercial zones, road infrastructures,

¹⁴ "Forest cover refers to the view that forests offer from the air, i.e. "the more or less continuous screen of branches and foliage formed by all the tree tops in a stand" (Institut de la Statistique du Québec, 2023).

¹⁵ "Agricultural land is land used for growing crops. It includes land used for cultivation, grazing, fallow, woodlands, swamps and marshes used for agricultural production. They exclude buildings and indoor production, such as hog and poultry farms. If an agricultural production includes both buildings and pastures, outdoor areas and buildings, their respective areas will be categorized separately. For example, a dairy farm with an area devoted to growing hay and barns will include an area of farmland and an area of artificial surface" (Institut de la Statistique du Québec, 2023).

parking lots, landfill sites, and tourist and leisure complexes¹⁶. In addition, 9.2 km² of forest have been converted to herbaceous and shrubby wetlands, mainly composed of alder¹⁷.

Table 7: Changes in forest and other cover from 1990 to 2003 and 2003 to 2014, MRC des Collines-de-l'Outaouais

Evolution	Unit	Forests	Artificial surfaces	Watercourses	Agricultural land
1990 to 2003	%	1,3%	11,0%	4,2%	-12,6%
	km ²	19,8	6,4	9,0	-34,7
2003 to 2014	%	0,0%	11,8%	3,3%	-6,4%
	km ²	-0,6	8,4	7,4	-15,1

Sources: Institut de la statistique du Québec, using maps and ecoforestry data from the Ministère des Ressources naturelles et des Forêts, May 2021; and Système sur les découpages administratifs, January 2022. Compilation Projets Territoires, 2023

Table 8: Change in forest cover to the benefit or detriment of other land cover, 1990 to 2003 and 2003 to 2014, MRC des Collines-de-l'Outaouais

1990 to 2003		km ²
	Forest losses to :	
	Water bodies and herbaceous wetlands	-9,2
	Artificial surfaces	-4,98
	Expansion of the forest at the expense of:	
	Agricultural land	33,6
2003 to 2014	Forest losses to the detriment of:	
	Water bodies and herbaceous wetlands	-7,0
	Artificial surfaces	-5,90
	Expansion of the forest at the expense of:	
	Agricultural land	12,3

Sources: Institut de la statistique du Québec, using maps and ecoforestry data from the Ministère des Ressources naturelles et des Forêts, May 2021; and Système sur les découpages administratifs, January 2022. Compilation Projets Territoires, 2023

¹⁶ "The phenomenon of transforming natural surfaces or agricultural land for residential, institutional, commercial or industrial use is known as land (or soil) artificialisation" (Institut de la Statistique du Québec, 2023).

¹⁷ Changes observed in wetlands should be interpreted with caution, as they may be the result of improved accuracy in data acquisition (Institut de statistique du Québec, 2022).



From 2003 to 2014

From 2003 to 2014, forest area in the MRC remained relatively stable, showing a slight decrease of 0.6 km². However, this period was marked by an acceleration in urbanization, with 5.9 km² of forest converted to artificial surfaces such as residential, industrial and commercial zones. In addition, 7 km² of forest were lost to the formation of water bodies and herbaceous wetlands.

Although the process of agricultural land clearing has slowed compared to the previous period, it remains significant, with a conversion of 12.3 km² of agricultural land to forest between 2003 and 2014.

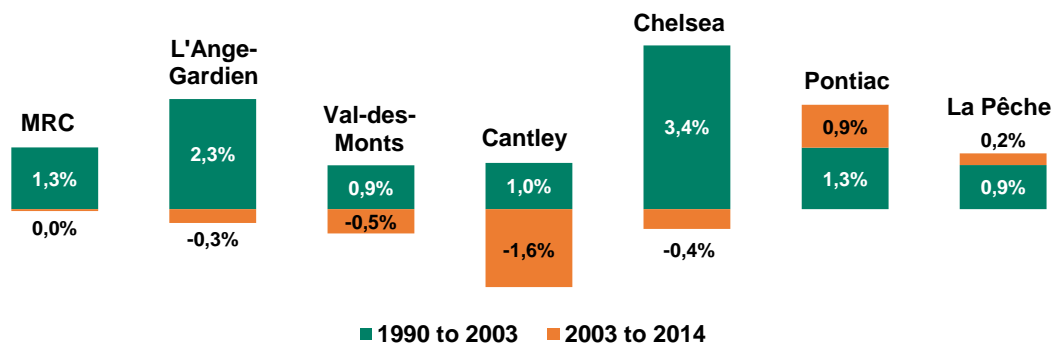
Comparison by municipality

All MRC municipalities recorded an increase in forest cover between 1990 and 2003. This increase was particularly marked in Chelsea (3.4%) and L'Ange-Gardien (2.3%). In all municipalities, the expansion of forest areas was at the expense of agricultural land, with variations ranging from 2.4 km² in Cantley to 9.2 km² in La Pêche. With the exception of Chelsea, all municipalities suffered a loss of forest to artificial surfaces. The greatest losses were recorded in L'Ange-Gardien and Val-des-Monts, which each lost 1.7 km² to artificial areas.

Between 2003 and 2014, only the municipalities of Pontiac (0.9%) and La Pêche (0.2%) recorded an increase in their forest cover, while the other municipalities saw the proportion of their forest decrease (between -0.3% and 1.6%). With the exception of Chelsea, all municipalities recorded a loss of forest due to artificialization (between -0.4 km² in Pontiac and -1.7 km² in Cantley) and to shrubby wetlands (from -0.5 km² in Cantley and L'Ange-Gardien to -2.7 km²).

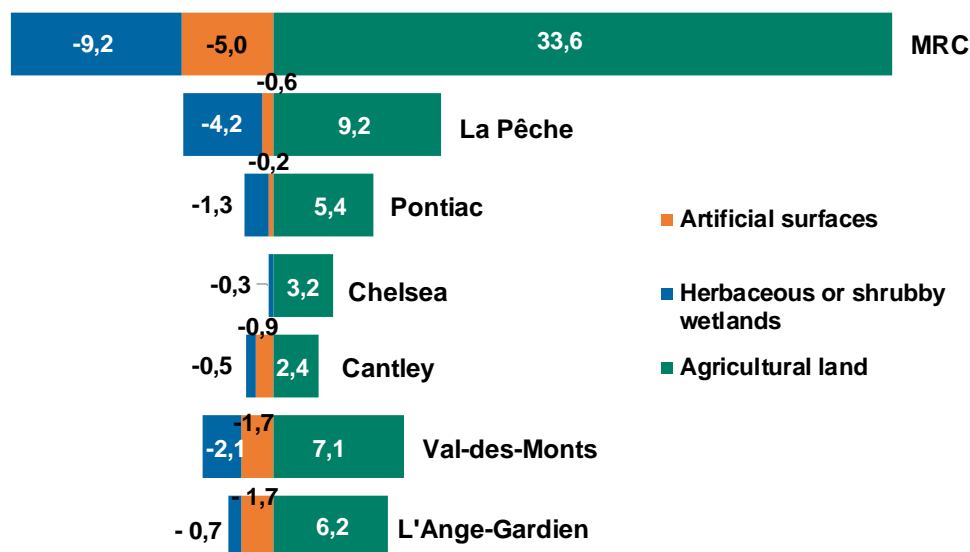
The increase in forest cover in favor of agricultural land continues in all municipalities, ranging from 0.4 km² in Cantley and Chelsea to 4.5 km² in La Pêche.

Figure 17: Forest evolution from 1990 to 2003 and from 2003 to 2014, MRC des Collines-de-l'Outaouais and its municipalities



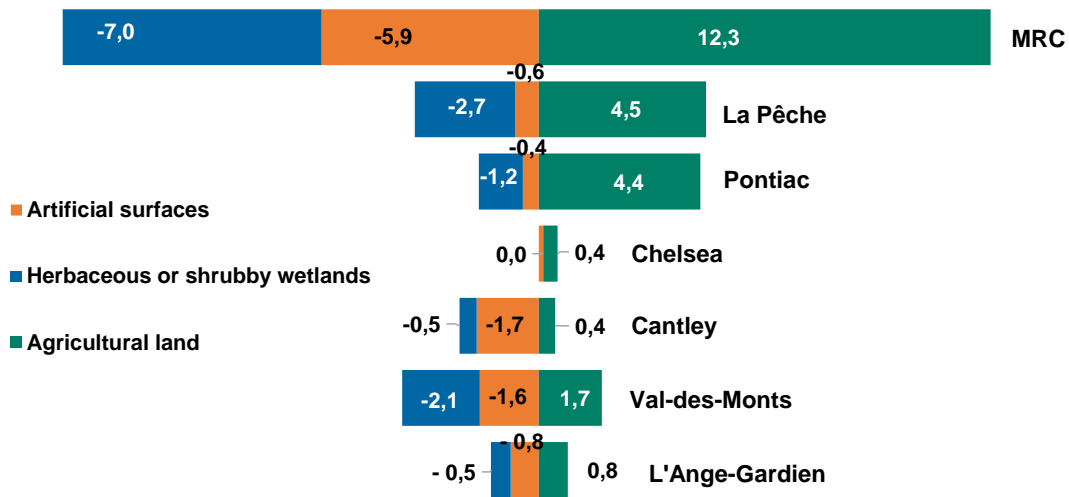
Sources: Institut de la statistique du Québec, using maps and ecoforestry data from the Ministère des Ressources naturelles et des Forêts, May 2021; and Système sur les découpages administratifs, January 2022. Compilation Projets Territoires, 2023

Figure 18: Change in forest cover to the benefit or detriment of other land covers, 1990-2003 (km²)



Sources: Institut de la statistique du Québec, using maps and ecoforestry data from the Ministère des Ressources naturelles et des Forêts, May 2021; and Système sur les découpages administratifs, January 2022. Compilation Projets Territoires, 2023.

Figure 19: Change in forest cover to the benefit or detriment of other land covers, 2003-2014 (km²)



Sources: Institut de la statistique du Québec, using maps and ecoforestry data from the Ministère des Ressources naturelles et des Forêts, May 2021; and Système sur les découpages administratifs, January 2022. Compilation Projets Territoires, 2023

5.3 The impact of climate change on forests

The forests of the MRC des Collines-de-l'Outaouais play a significant role in the fight against climate change. They are also vulnerable to climate change, which has already begun to affect the Outaouais region. The study by Doyon, Montpetit and Cyr (2012) examines these potential impacts on Outaouais forests.

In summary, climate change is manifesting itself in the following trends:

- An increased risk of forest fires, with an extension of the fire season and an increase in their frequency, size and severity.
- Increased populations of insect pests and diseases affecting forests.
- An increase in the frequency of extreme weather events, such as floods, ice storms and droughts.
- An increase in average temperatures and the growing season, as well as greater variability in climatic conditions.

These climatic changes are likely to have devastating effects on trees, leading to significant changes in growth, forest productivity and forest stand composition. One notable consequence is that the proportion of hardwoods is likely to increase with climate change, as suggested by the research of Roy, McCullough, Forget and Doyon (2009, p.1).

6. Conclusion

This project has been crucial in aggregating and organizing data from various sources, transforming them into synthetic tools to present the state of forests in the municipalities of the MRC des Collines-de-l'Outaouais, highlighting their challenges and potentials. It's important to remember that these summaries are intended to enhance the value of this natural heritage, which is an integral part of our regional identity in the Outaouais, while helping us to consider its future in a proactive way.

This research also has a documentary and statistical watch function. By identifying and compiling all available data on the forest in the MRC des Collines-de-l'Outaouais, it provides a valuable resource for tracking changes in the forest situation over time. This will provide decision-makers, researchers and other stakeholders with up-to-date, reliable information to guide their actions and policies in terms of forest management and biodiversity conservation.

By way of follow-up, these summary tools can be enhanced over time and updated regularly to track changes in the state of forests across the territory, with the aim of fostering their resilience in the face of climate change. This situation report is also the first step in the Mapping our Community Forest project, which will be followed by several phases.

Finally, the analysis of information at municipal and MRC level is relevant, given that these are the administrative territories where many decisions are made. However, the forest is not limited to these administrative boundaries, but rather constitutes a whole that goes beyond them. It is therefore essential to consider the links between these territories, and to work together to ensure effective, coherent forest management.

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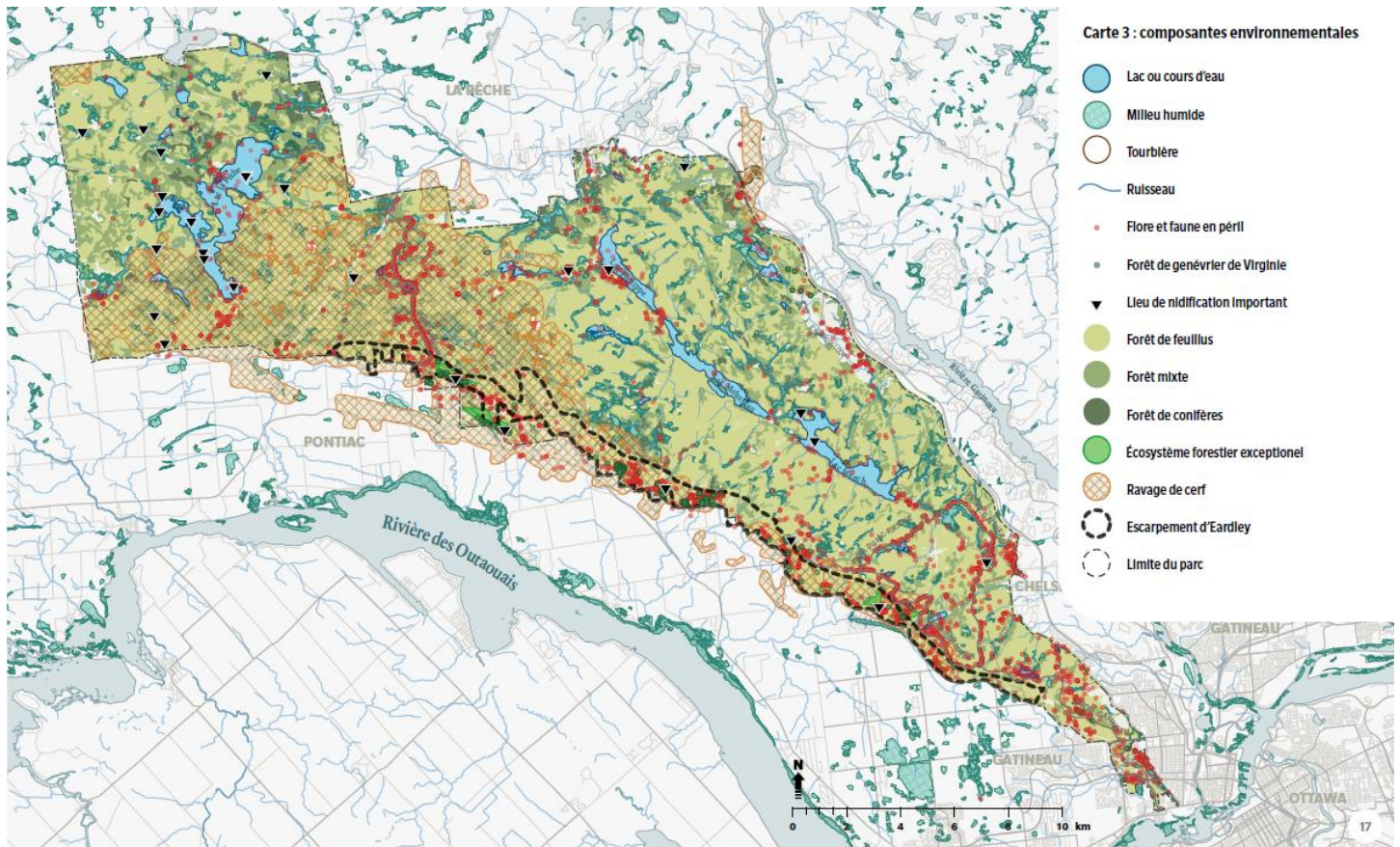
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Appendix 1: Gatineau Park: environmental components

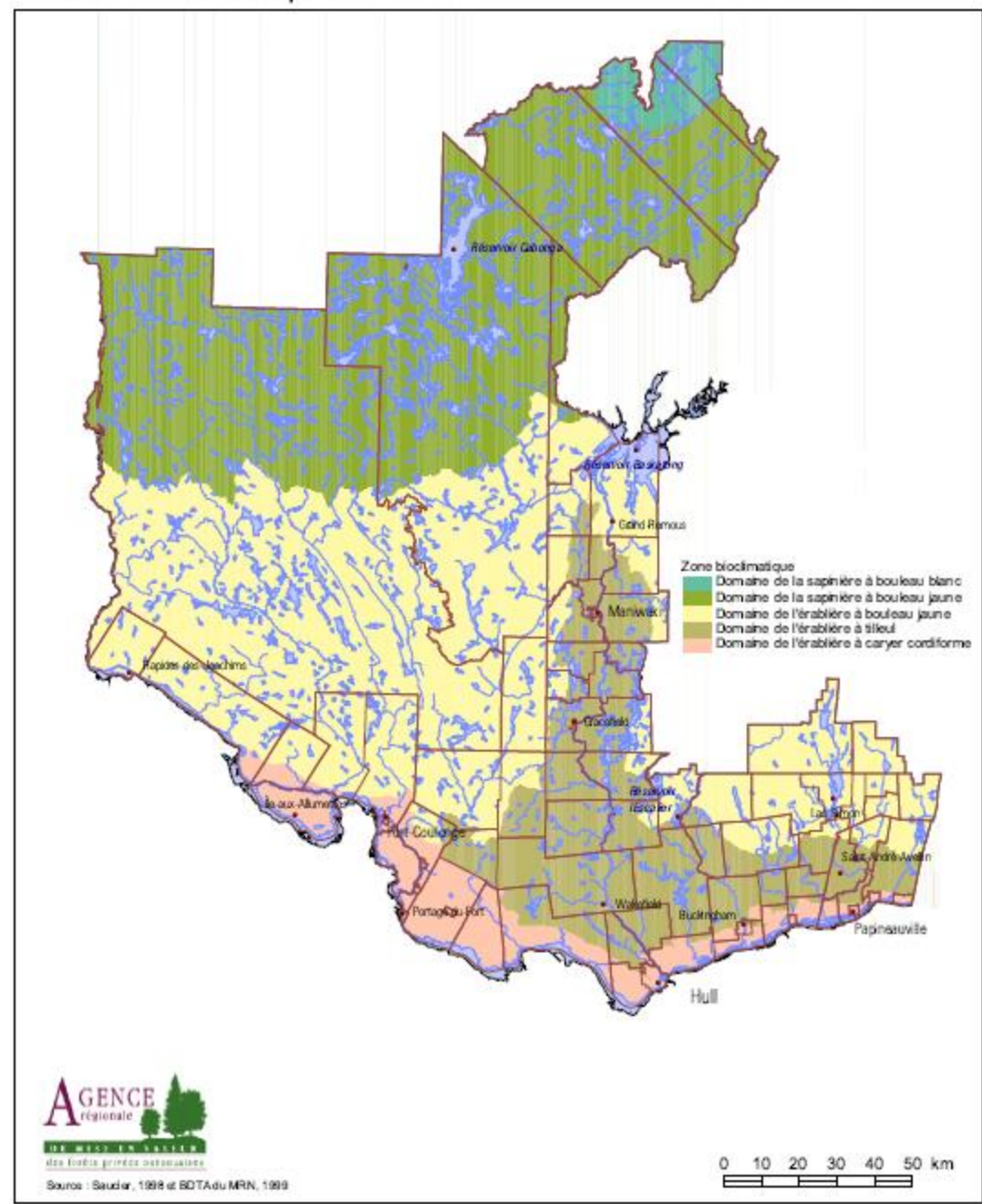


Source : National Capital Commission, 2021, p.17. https://ncc-website-2.s3.amazonaws.com/documents/GPMP_French_2021_02_26_Single_Page.pdf

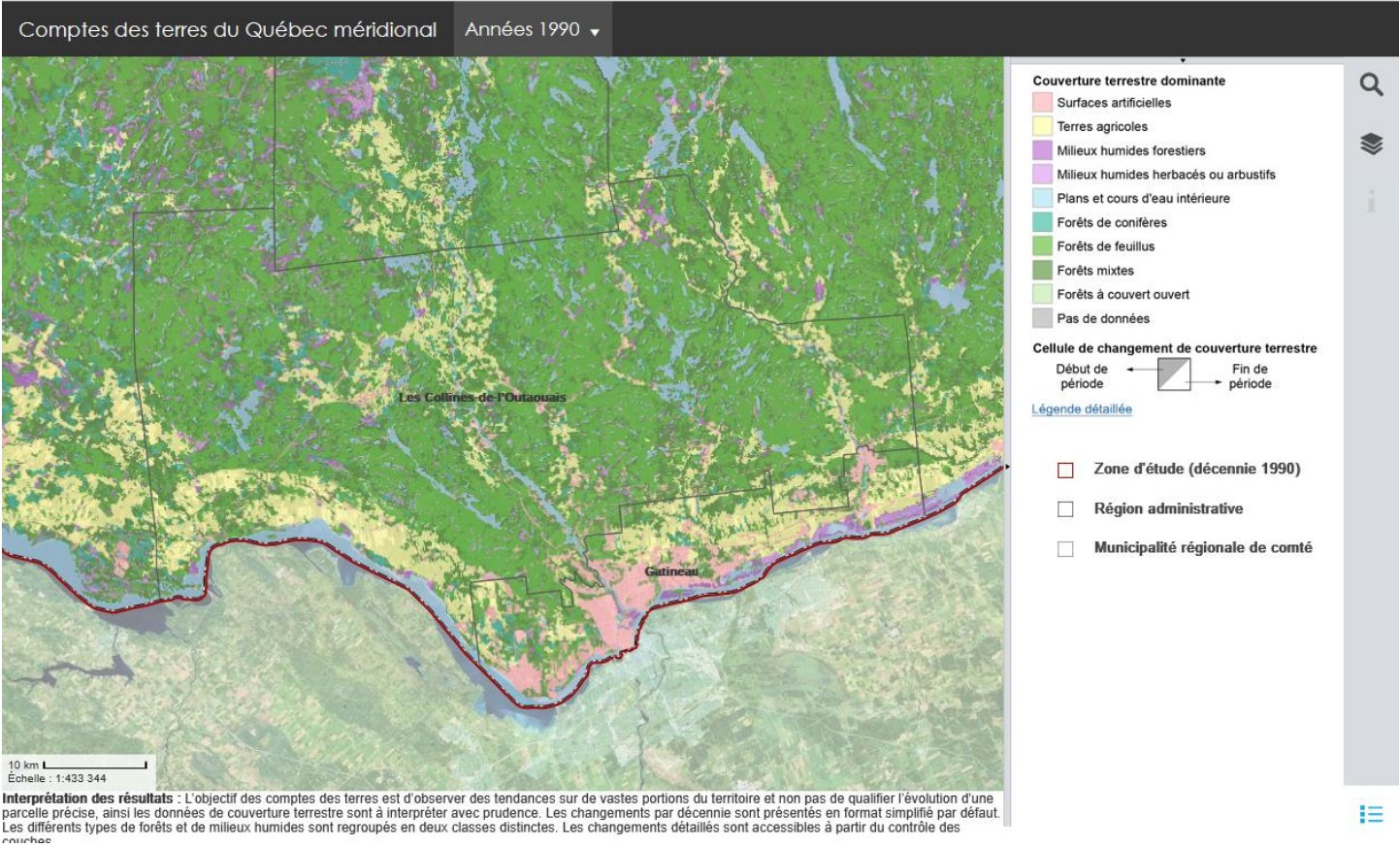


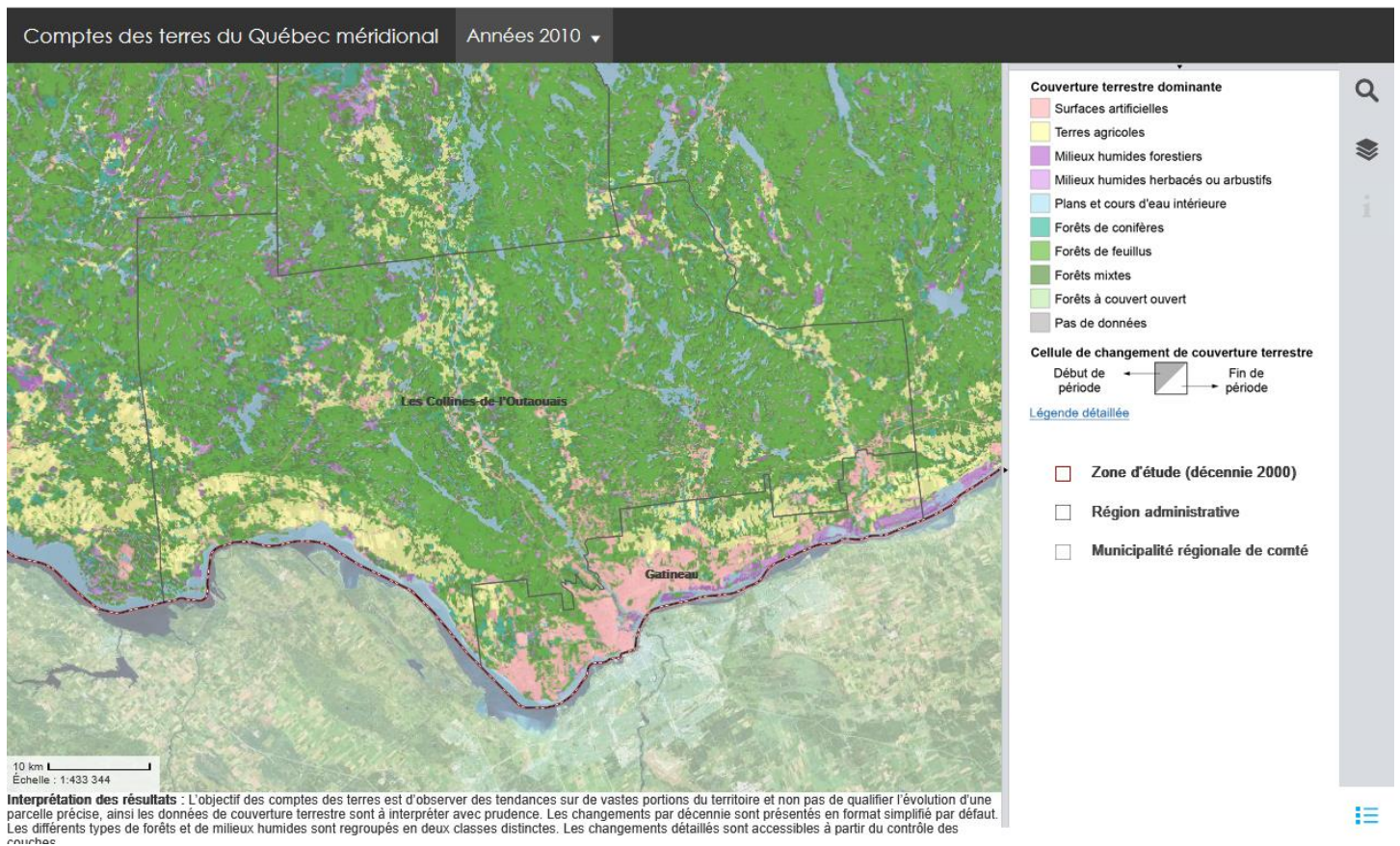
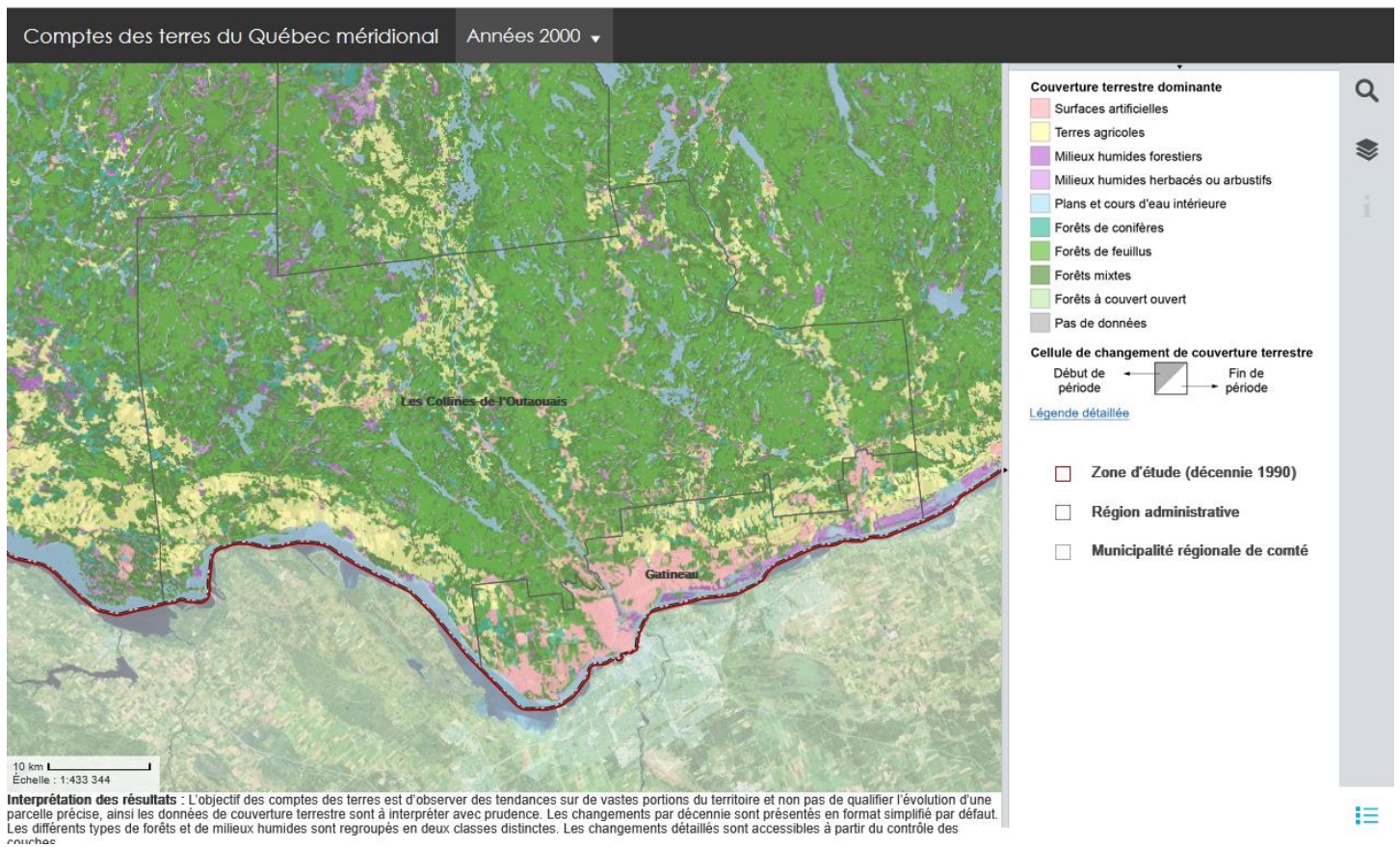
Appendix 2: Bioclimatic zones in the Outaouais region

Domaines bioclimatiques



Appendix 3: Land account maps for 1993, 2003 and 2014





Source : Institut de la Statistique du Québec, 2023.

