CONSULTATION DOCUMENT

COMMISSION INDÉPENDANTE SUR LES
CARIBOUS FORESTIERS ET MONTAGNARDS

SPRING 2022

Québec

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Pierre Pouliot

Commission indépendante sur les caribous forestiers et montagnards

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1. INDEPENDENT COMMISSION'S MANDATE

1.1. INTRODUCTION

On November 5, 2021, as part of its effort to ensure the survival of forest-dwelling caribou populations in Québec and the mountain caribou population, the Québec Government announced the creation of the *Commission indépendante sur les caribous forestiers et montagnards* (referred to as "the Commission" in this document)[1].

A series of regional public hearings will be held, starting in April 2022, to gather opinions from the general public on the measures to be included in an adapted management strategy for caribou habitat. To provide information and facilitate the process of reflection, the Ministère des Forêts, de la Faune et des Parcs (MFFP) has developed two theoretical, hypothetical management scenarios that are presented as appendices to this document.

1.2. MANDATE

The theoretical and hypothetical scenarios were developed to inform participants and in particular to help them consider the concerns and issues and make recommendations on the topics under consideration. The Commission will meet with the general public, Indigenous communities and stakeholders from the regions concerned, to hear their views on the two scenarios, which are designed to foster caribou self-sustainability in the areas to which the Strategy will apply. The first scenario was devised following the MFFP's analysis of the potential solutions proposed by the regional operations groups (ROGs), and the second scenario would have no additional impact on timber supplies, compared to the existing caribou habitat development plans.

For each of these scenarios, the consultation document describes the areas to which they would apply, the impacts they would have for caribou populations and timber supplies for the forest industry, an estimate of caribou population and habitat management costs, and an estimate of the economic consequences.

[1] Information on the three commissioners can be found in Appendix 1..

2. CONSULTATION PROCESS AND KEY DATES

The Commission would like to hear the opinions of interested parties on the two theoretical scenarios proposed by the MFFP, and also on potential variants or other ideas that would help to achieve a realistic, defendable balance reconciling woodland caribou protection goals with economic interests
Any individual or stakeholder that would like to submit an opinion to the Commission on the two caribou habitat protection scenarios can do so using one of the three methods described below:

- By attending a public hearing
- By submitting a brief
- By completing an online questionnaire

2.1. PUBLIC HEARINGS

Seven public hearings will take place in April and May 2022. The exact dates and towns will be made public at the same time as the consultation document. Choices will take into account proximity to the stakeholders and to the forest-dwelling and mountain caribou populations concerned, and ease of access.

You may register for the hearings via the Commission's website, by clicking on the "Calendar" tab.

2.2. BRIEFS

Individuals may submit briefs to the Commission, setting out and arguing their opinions on the two proposed protection scenarios, potential variants or separate approaches. Briefs must be filed directly on the Commission's website, in PDF format, under the "How to take part" tab.

The deadline for submission of briefs is **Tuesday, May 31, 2022**.

A list of questions can be found in the "How to take part" tab, to help with the preparation of briefs.

2.3. ONLINE QUESTIONNAIRE

Opinions may also be submitted by answering a short online questionnaire, also available on the Commission's website until **Tuesday, May 31, 2022**. The Commission would like to hear the opinions of interested parties on the two scenarios developed by the MFFP, as well as on potential variants or other ideas that would allow for a realistic, defendable balance between the goal of protecting forest-dwelling caribou and the economic interests that are at stake. Respondents may answer some or all of the following questions:

- In your opinion, what elements should be considered as priorities when devising the strategy?
- In your opinion, should the strategy aim to restore all populations regardless of the effort required, or should it focus on the populations that have a better chance of being restored?
- What do you think would constitute a fair balance between the scope of the caribou protection measures to be implemented and the resulting social and economic impacts?
- Would you like to make suggestions to the Commission concerning the recommendations that should be retained?

3. CURRENT STATUS

This consultation document summarizes the main available data on forest-dwelling caribou in Québec and mountain caribou. Additional information can be found in the reference documents, including those that are available on the Commission's website.

3.1. INTRODUCTION

Forest-dwelling caribou populations in Québec and mountain caribou populations are in a vulnerable situation. Several key biological indicators of population status (total numbers, survival rates and recruitment rates) are showing worrying signs that are characteristic of populations in decline, and some groups are facing the risk of extinction.

As a result of these observations, the forest-dwelling caribou was designated as a "vulnerable" species in 2005, under Québec's *Act respecting threatened or vulnerable species*. As for the mountain caribou population, it was assigned "threatened" status under the same Act in 2009.

These legal designations of forest-dwelling caribou and mountain caribou led to the establishment of two recovery teams tasked with making recommendations to the Minister of Forests, Wildlife and Parks with a view to fostering restoration of the species. These teams are the Québec Forest-Dwelling Caribou Recovery Team and the Mountain Caribou Recovery Team. Many of the measures proposed in the recovery plans produced by these teams have since been implemented, including numerous knowledge acquisition projects and measures aimed at managing and protecting both the caribou and their habitat.
In addition, in April 2016, the Québec Government announced its *Woodland Caribou Habitat Stewardship Plan* in which it undertook to prepare a long-term management strategy for the caribou and its habitat. In February of 2019, the MFFP published its Caribou Population Recovery Plan.

Despite the protection measures introduced since the legal status designations were granted, the mountain caribou population and most of the forest-dwelling caribou populations in Québec have continued to decline – in other words, the number of births is less than the number of deaths. In the period 2005 to 2016, the total estimated number of individual animals in forest-dwelling caribou populations in Québec ranged from 5,635 to 9,981 individuals. Roughly 40 mountain caribou remained in Gaspésie in 2020.

In April 2019, Pierre Dufour, the Minister of Forests, Wildlife and Parks and Minister responsible for the Abitibi-Témiscamingue and Nord-du-Québec regions, revealed the steps to be taken to complete the forest-dwelling and mountain caribou strategy. The announcement also revealed the areas to which the strategy would apply, along with some strategic data.

The new strategy for forest-dwelling and mountain caribou will be based on current scientific knowledge and on the results of consultations with the stakeholders concerned, including local and Indigenous communities. It will also be based on the opinions of experts in the field, and in particular on studies assessing social and economic impacts and the impacts of climate change on elements of caribou habitat.

3.2. RIGHTS AND INTERESTS OF THE FIRST NATIONS

Several First Nations have pointed out that the caribou plays a vital role in the survival and development of their communities, in the context of their longstanding occupation of the territory. They describe the close connections they have forged with the species, which have helped to shape their identity, culture and lifestyle, as well as their social and spiritual universe. Even today, the caribou have a strong social, economic, cultural and symbolic value for these communities. They believe the caribou is vital to the maintenance of their cultures and the transmission of their values, languages, lifestyles and knowledge.

Several First Nations hold or have claimed ancestral or treaty rights in Québec. Among other things, the strategy must represent a continuation of the agreements entered into by Québec and the Indigenous nations and communities, and the constitutional duty to consult and, where applicable, accommodate them must also be fulfilled.

During the participatory and consultation processes for the First Nations, they mentioned the importance of being closely involved in every step of the caribou recovery process. They want their knowledge to be included, and would like to strengthen and improve recognition of their capacities with respect to caribou population recovery. They also mentioned the need for recovery, given the importance of caribou hunting for sustenance, ritual and social purposes in their cultures. Several First Nations have invested time and resources to foster preservation of caribou populations and to maintain their special connection with the animal.

3.3. POPULATION OVERVIEW

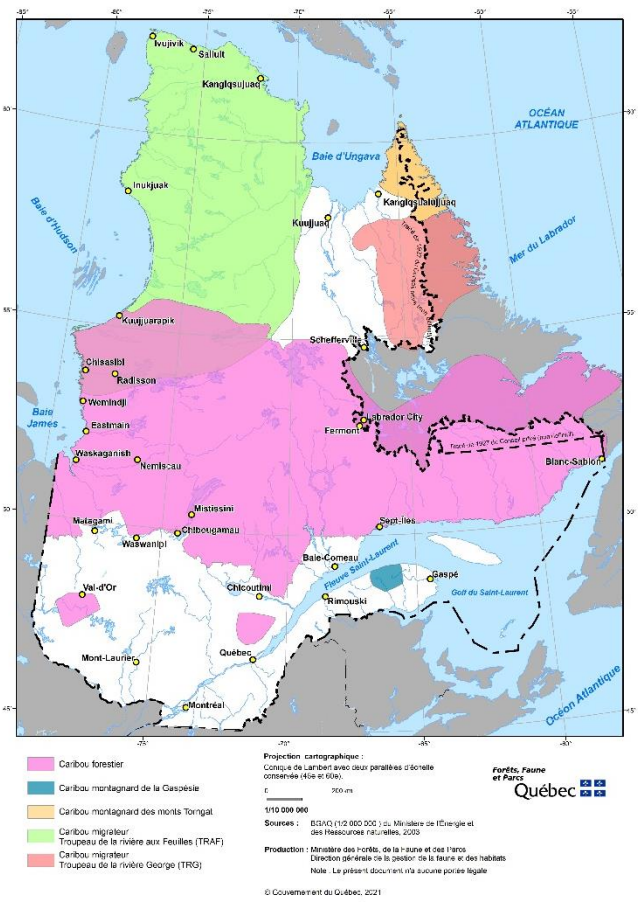
In Québec, all caribou belong to the woodland caribou subspecies. They are classified by ecotype, depending on the place where the population lives, its characteristics and its specific behaviours.

There are three caribou ecotypes in Québec: forest-dwelling, mountain and migratory.

- **Forest-dwelling caribou:** This ecotype is mostly sedentary and, in Québec, occupies a strip of boreal forest located between the 49th and 55th parallels. Two isolated populations, those of Val-d'Or and Charlevoix, live south of the 49th parallel. As mentioned earlier, this ecotype has been designated as a vulnerable species in Québec since 2005.
- **Mountain caribou:** This ecotype lives in mountainous environments and may undertake short seasonal migrations to change altitude. The Gaspésie population mainly frequents the Gaspésie provincial park and surrounding areas. It is the last relic of the caribou presence south of the St. Lawrence River, and as mentioned earlier, was designated as a threatened species in Québec in 2009. The Independent Commission's work does not apply to the mountain caribou population in the Monts Torngat sector.
- **Migratory caribou:** This ecotype occupies the taiga, the tundra and the Arctic tundra in Northern Québec, It forms large groups that undertake long seasonal migrations. The Independent Commission's work does not apply to the migratory caribou ecotype.

The map below shows the ranges of each caribou ecotype in Québec.

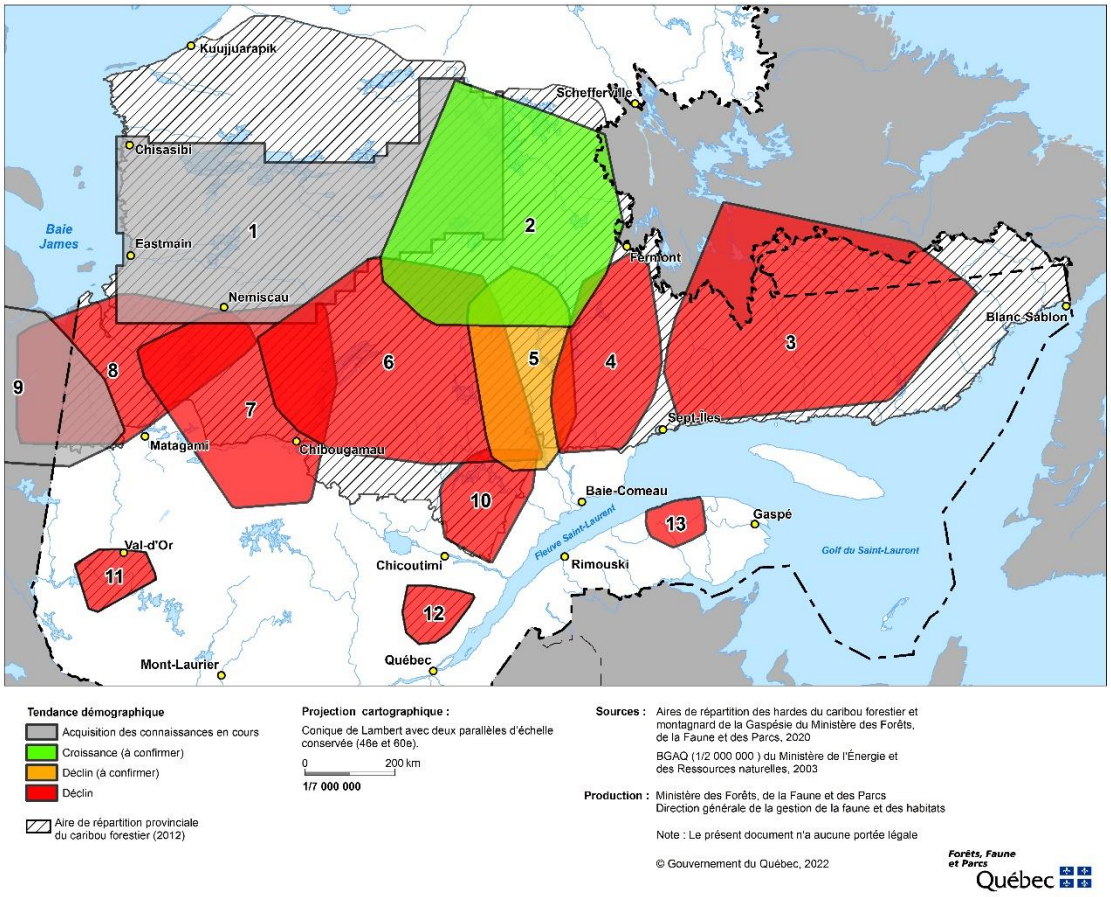
Map 1. Ranges of caribou ecotypes in Québec



3.4. KEY FIGURES

The map below shows the demographic trend[2] in recent years (2010 to 2019) and reveals that only one population is currently growing: the Caniapiscau sector population. Except in the James Bay, Detour and Outardes sectors, where the trend has yet to be confirmed, all the other forest-dwelling caribou populations and the mountain caribou population are declining. Recent inventories have also confirmed that some isolated populations (Val-d'Or, Charlevoix and Gaspésie) now face the risk of extinction if no new measures are applied.

Map 2. Demographic trends among populations in recent years



[2] The demographic trend is calculated using demographic indicators (recruitment rate and adult survival rate) or variations of abundance over time as observed during aerial inventories. The period used to estimate the demographic trend varies from one population to the next, and may cover any of the years between 2010 and 2019.

The table below shows the low abundance level of forest-dwelling caribou and mountain caribou in the sectors in which inventories have taken place, along with the total estimated population, for the period 2011 to 2021. For information, the term "abundance" refers to the number of caribou observed, not corrected to reflect caribou detection rates during inventories.

Table 1. Minimum abundance and population size for forest-dwelling caribou in Québec and mountain caribou

	Population/sector[3]	Year of last inventory	Minimum abundance	Total estimated population[4]
1	Baie-James[5]	2020	430	Not applicable
2	Caniapiscau	2018	476	Not available
3	Moyenne-Côte-Nord	2020	102	175
3	Basse-Côte-Nord	2019	452	569
4	Manicouagan	2020-2021	556	930
5	Outardes	Inventory to come (2022)	Not available	Not available
6	Témiscamie	2019	2 201	2 511
7	Assinica	2013	509	580
8	Nottaway	2016	262	308
9	Detour	2011	63 [6]	Not available
10	Pipmuacan	2020	177	225
11	Val-d'Or	2021	7	Not applicable
12	Charlevoix	2021	17	20
	Subtotal		**5 252**	**---**
13	Gaspésie	2020	35	40

[3] Inventoried areas may differ from ranges or from the sectors delimited in 2020 using available telemetric data, sometimes quite significantly.
[4] Estimate produced by applying a correction factor based on a visibility rate ranging from 58 % to 97 %, depending on the sector.
[5] Data acquisition is ongoing in these sectors where populations have not yet been defined. The caribou observed during these inventories may therefore belong to adjacent populations or to populations that have not yet been delimited.
[6] Minimum abundance observed only in the Québec portion of the Détour population range, which is situated in both Québec and Ontario.

3.5. DECLINE FACTORS

There are many factors that may hinder the maintenance of caribou populations, including:

Habitat disturbances:

- of human origin, caused by industrial activities, roads and the resulting increase in predation;
- of natural origin, such as forest fires or insect infestations;
- related to climate change.

Disturbance of animals by:

- humans – for example during recreational and tourism activities such as off-trail skiing and snowmobiling;
- the emergence of parasites and diseases.

These factors do not all have the same impact, but when combined may aggravate the situation considerably.

The greatest threats to the forest-dwelling caribou and the mountain caribou are habitat disturbances of human origin and the resulting increase in predation caused by the imbalance in the ratio of caribou, other prey species and their predators.

The caribou's main predators are the grey wolf, the black bear, the coyote and the Canada lynx. The wolf is the main predator of adult forest-dwelling caribou in Québec and the coyote is the main predator of mountain caribou calves.

Habitat disturbances of human origin are caused mainly by forestry, mining and energy-related activities, the development of roads and electricity transmission lines, and developments for recreational and tourist activities. All these elements fragment habitats and alter their composition, hindering caribou movements, reducing the availability of good quality habitat and increasing exposure to predators. Habitat quality and the caribou's chances of survival are both compromised as a result.

For example, forest roads create openings in habitats, allowing predators to reach their prey more easily. Forest development also leads to rejuvenation of the forest. Contrary to other species such as the moose and white-tailed deer, the caribou needs mature forests in order to survive, feed and reproduce.

In some regions, harvesting may also have a key impact on caribou population dynamics, especially when they are declining. Harvesting includes illegal killing (poaching) and harvesting for sustenance, ritual and social purposes, in particular by members of Indigenous populations.

4. REVIEW OF THE MINISTERIAL TOUR IN 2019

In view of the ongoing general decline in forest-dwelling caribou populations and the mountain caribou population, the Government adopted an action plan in 2016, which called for the development of a strategy for forest-dwelling and mountain caribou. In the wake of the action plan, the MFFP has carried out several characterization studies of forest-dwelling and mountain caribou habitats with a view to prioritizing the protection efforts to be included in the future strategy.

For information: Key elements of caribou habitat

To maintain a caribou population, a large area of at least 5,000 km² is required, or an area adapted to a given population's ecology, in which habitat development measures adjusted to the needs of the caribou are applied.

These measures must allow for the maintenance of essential habitat characteristics, such as large tracts of forest of around 1,000 km², while speeding up the return to a habitat that is favourable to the caribou where necessary.

Some of the environmental factors to be considered include the importance of managing and limiting disturbances in caribou habitat. It has been shown that, when a caribou habitat in Canada undergoes a disturbance over 35% of its area, there is only a 60% chance that the population will be self-sustaining.

Habitat connectivity is also a fundamental aspect of management, to encourage exchanges and travel between good quality habitats.

A number of tools have been developed by the MFFP to adjust zone boundaries and prioritize area choices. A map of preferred habitats was produced by summarizing data on habitat quality and frequentation by the caribou. A multi-criterion analysis was also carried out using the same parameters as for preferred habitats, along with some additional data such as the merchantable value of standing timber, territorial occupation and proximity to protected areas.

The desired end result is to identify the areas that should be given priority and to draw up a forest development approach that encourages self-sustainability for forest-dwelling caribou populations and the mountain caribou population. The cornerstone of this development approach is habitat disturbance management.

The following orientations have been emphasized:

- Protect the essential characteristics of habitats.
- Speed up the return to a favourable habitat.
- Limit disturbances over time.
- Maintain connectivity.
- Create environments less conducive to caribou predators and their other prey.
- Limit impacts on allowable cuts.

During the ministerial tour of 2019, the MFFP therefore proposed a form of zoning based on areas that are exempt from forest development, i.e. areas located north of the northern limit for timber allocations and protected areas falling within the caribou range. Three other types of areas were added: extensive favourable areas (EFAs), habitats undergoing restoration (HURs) and connectivity zones (CZs). These areas were chosen for their synergy with the areas exempt from forest development and the areas frequented by the caribou populations concerned.

Northern limit for timber allocations
Under the proposed zoning plan, the northern limit for timber allocations, applied by Québec since April 1, 2018 and supported by the recommendations of a scientific committee, in combination with the Basse-Côte-Nord forestry reserve, provides protection from timber harvesting for 57% of the range used by forest-dwelling caribou populations in Québec. No forest development activities aimed at harvesting timber for commercial purposes can be carried out north of this limit.

Protected areas
Protected areas will play a major role in achieving the aims, due to the strict conservation measures that are applicable in these natural environments. In several cases, protected areas form the cores around which the EFAs and HURs will be created. The large protected areas in the Rivière Broadback sector (9,134 km^2) in the Nord-du-Québec region and those in Caribous-forestiers-de-Manouane-Manicouagan (10,194 km^2). which overlap into the Saguenay–Lac-Saint-Jean and Côte-Nord regions, have been drawn up so as to maximize the protection of good quality habitats for forest-dwelling or mountain caribou. In all, 86,184 km^2 of protected areas form part of the ranges of caribou populations.

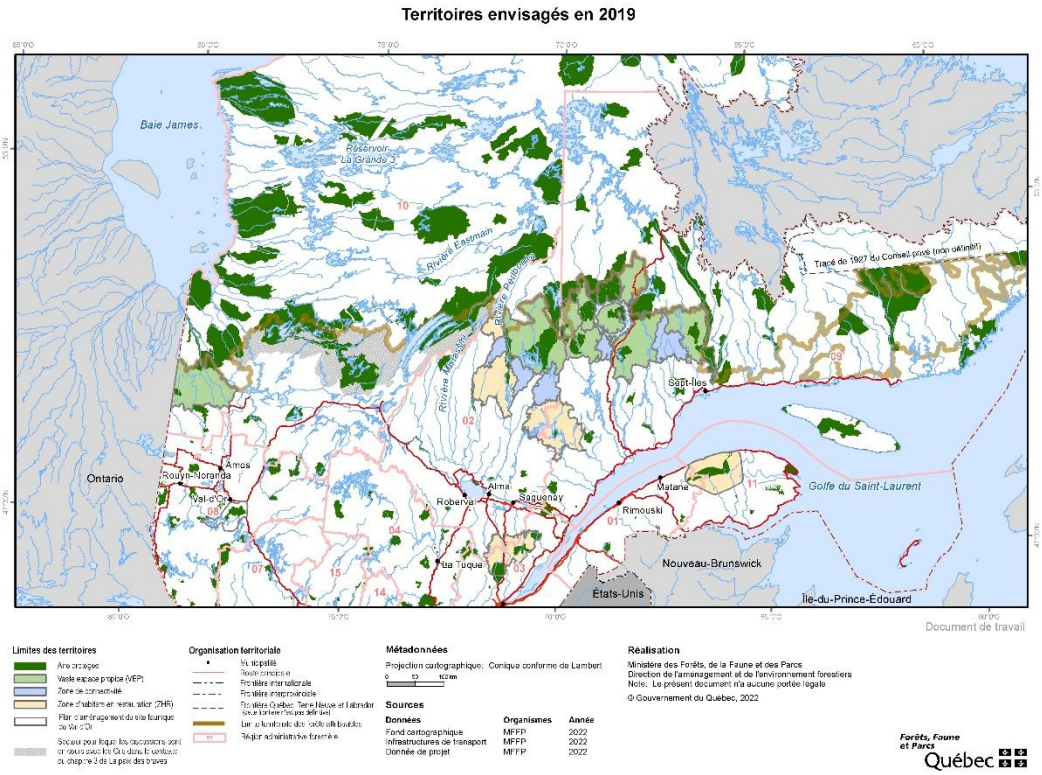
Areas under forest development
The MFFP proposes to divide the area under forest development, located south of the northern limit for timber allocations, into zones which, alone or together, form vast tracts of at least 5,000 km^2. These zones have been established using an analysis of landscape level disturbances, along with information concerning caribou presence and frequentation. In the first two types of zones – extensive favourable areas (EFAs) and habitats undergoing restoration (HURs) – disturbance rates would be managed with a view to achieving caribou population self-sustainability. In the third type – connectivity zones (CZs) – the aim would be to maintain connectivity without placing any particular controls on disturbance rates. These three types of areas are described briefly in Table 2 below. Appendices 2 and 3 contain additional information on the characteristics of these areas and the proposed habitat management measures in each case.

Table 2. Description of the three types of zones proposed for the forest-dwelling and mountain caribou strategy in the forest under development

Zones	Characteristics	General aim	Disturbance rate
Extensive favourable areas (EFA)	Habitats that have undergone little to no disturbance	Adapt forestry work in order to maintain good quality habitats	Limit to roughly 35 %
Habitats undergoing restoration (HUR)	Habitats that have undergone moderate to extensive disturbance	Adapt forestry work to foster active restoration and recovery of good quality habitats	Restore to approximately 35 %
Connectivity zones	Habitats that have undergone moderate to extensive disturbance	Allow for exchanges between caribou populations and between EFAs and HURs	Management of disturbance rates is not anticipated at this time

Based on the MFFP's analyses, areas under consideration for the strategy were presented during the ministerial tour in 2019. These areas are shown on the map below.

Map 3. Areas under consideration in 2019



After the ministerial tour, the MFFP set up a number of regional operations groups and tasked them with discussing the areas under consideration for the strategy and the conditions that could be applied to them. The groups' aims were:

- to identify and prioritize issues, concerns, operational information and information on the potential social and economic repercussions;
- to propose potential solutions for consideration.

The regional operations groups presented the results of their work to the MFFP in 2020.

5. PRESENTATION OF TWO HYPOTHETICAL SCENARIOS

To assist the Commission's team with the task of preparing the consultations, the MFFP has produced two theoretical management scenarios for caribou populations and habitats. These scenarios were prepared with a view to informing participants about the concerns and issues to be considered, and helping them to formulate recommendations. Although recommendations were made by the regional operations groups as a result of their discussions, the MFFP now wishes to broaden the consultation to all individuals and organizations that wish to take part.

Please see Appendix 5 for a detailed description of the scenarios.

The scenarios, each presenting a distinctive vision, are just two of many possible options. Commission participants may therefore propose other alternative or middle-ground solutions for caribou population and habitat management, especially those that will help to achieve a balance between the measures applied and their social and economic consequences.

6. CONCLUSION

As part of its mandate, the Commission wishes to hear the opinions of interested parties on the two theoretical, hypothetical scenarios prepared by the MFFP, and on any variant of these scenarios or other ideas that would help to achieve a realistic balance between the aim of protecting the caribou and the social and economic interests at stake.
Individuals and stakeholders wishing to submit their opinions on the two theoretical caribou habitat protection scenarios presented in this document, or on any variant of those scenarios, may do so in any of the following ways:

- by taking part in a public hearing;
- by submitting a brief;
- by completing an online questionnaire.

If you have questions about the consultation document, please send them by e-mail to: info@commissioncaribous.gouv.qc.ca.

7. APPENDICES*

* APPENDICES 2 TO 5 HAVE BEEN PREPARED BY THE MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS

7.1. APPENDIX 1
The three commissioners

The Independent Commission is chaired by Nancy Gélinas, who is Dean of Université Laval's Faculty of Forestry, Geography and Geomatics. Her fellow commissioners are Clément D'Astous and Florent Gagné.

Nancy Gélinas
Nancy Gélinas is the first women in the history of Université Laval to hold the position of Dean of the Faculty of Forestry, Geography and Geomatics. She is also a professor and researcher in the field of forestry economics.

Educated entirely at Université Laval, with qualifications from three different faculties, she took a multi-disciplinary academic path that culminated in 2001 with a Ph.D. in Forestry Science. She was hired as a professor at Université Laval in 2004. Prior to that, she began her career at the University of Moncton, in the Faculty of Forestry at the Edmundston campus, in 1997. She therefore has more than 25 years of experience of forestry research, teaching and consulting.

Clément D'Astous
Clément D'Astous has more than 34 years of experience in Québec's civil service, including more than 16 years as a State administrator.

His qualifications include a Bachelor's degree in Economic Science and a Master's degree in the same subject, both from the University of Ottawa, as well as a Master's degree in Business Administration from Université Laval.

Among other things, he has been a Deputy Minister at the Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques and was also a Vice-President at Retraite Québec. In addition, he was Associate Deputy Minister at the Ministère des Finances and Associate Secretary and Assistant at the Secrétariat du Conseil du trésor.

In 2019, he became a member of the Comité de rémunération des procureurs aux poursuites criminelles et pénales.

Florent Gagné

Florent Gagné has more than 37 years of experience in Québec's civil service and with the federal government, including more than 22 years as a State administrator.

He has a Bachelor's degree and a Master's degree in sociology, and is also a certified as a company director by the Collège des administrateurs de sociétés.

From 1983 to 1994, he was successively Associate Deputy Minister and then Deputy Minister at the Ministère des Affaires municipales. From 1994 to 1998, he was Deputy Minister of Public Security, and was subsequently appointed Director General of the Sûreté du Québec, a position he held until 2003. From 2003 to 2005, he was Deputy Minister of Transportation.

Since 2006, he has carried out a variety of consultation tasks on problems relating to administration and public policy. In June 2006, he was appointed by the Government to chair the board of directors of the Société nationale du cheval de course, where he oversaw the privatization of racecourses in Québec. In 2009, he chaired the working group on ethics in municipal communities.

He also chairs the board of directors of Revenu Québec and has been a Government negotiator in some specific Indigenous matters.

7.2. APPENDIX 2

Table 3. Characteristics and caribou habitat development measures in EFAs, HURs and CZs

ZONES	Characteristics	Main aim	Proposed development measures
Extensive favourable areas for caribou	Large areas that have undergone very little human or natural disturbance and are frequented by forest-dwelling caribou These areas are roughly 5,000 km² in size	Maintenance of large, good quality landscapes for forest-dwelling caribou	Specific land and resource development measures are applied in these areas in order to foster caribou population self-sustainability. The proposed measures include stringent management of disturbance rates, long-term protection of good-quality forest tracts and adjustments to the spatial distribution of logging areas, combined with the dismantling of multi-purpose roads.
Habitats undergoing restoration	Large areas that have undergone moderate or extensive human or natural disturbance and are frequented by forest-dwelling caribou or mountain caribou Many of these areas are roughly 5,000 km² in size	Active restoration of large areas with good quality habitats for forest-dwelling caribou or mountain caribou	To foster caribou population self-sufficiency, restoration efforts will take place in these areas in the short, medium and longer term, and special land and resource development measures will be applied. The proposed development measures in HURs are basically the same as in EFAs. Given the degradation of these areas, adapted measures and zoning are proposed for specific sites and active habitat restoration actions (e.g. dismantling of multi-purpose roads) will be needed to improve habitat characteristics as quickly as possible.
Connectivity zones	Areas that have undergone moderate or extensive human or natural disturbance and are frequented by forest-dwelling caribou	Maintenance or restoration of areas conducive to movement by caribou within the same population, between populations and between areas covered by the strategy. Reduction of the risk of creating new, isolated populations.	A special effort will be made in these areas to maintain or restore key habitat components, thereby fostering connectivity for the caribou. Knowledge acquisition projects are underway to identify the components that are most important for connectivity. Until this information is made available, good quality parcels of habitat within these areas have been protected and closed cover stand targets have been included in the development measures.

7.3. APPENDIX 3

1. General development measures for EFAs and HURs

Disturbance management
For EFAs and HURs, it is proposed that disturbance rates be managed in the individual entities and at development unit level. Generally, forest development measures would aim to ensure that disturbance rates remain below 35%. Harvest rates would be adjusted to comply with this rate.

In EFAs, the 35% threshold would generally not be exceeded at the time the area is delimited. Forest planning would therefore aim to remain within that threshold.

In HURs, where disturbance rates would already be quite high, forest development measures would aim to reduce those rates to around 35% over a timeframe not exceeding 50 years. The HURs would be priority areas for active habitat restoration initiatives, mostly involving the dismantling and reforestation of multi-purpose roads. Passive restoration measures would also be used, e.g. natural growth of previously-disturbed stands (natural or human disturbances).

Protection blocks
Potential caribou protection blocks composed of forest stands covering areas of between 30 and 250 km^2 have been identified in the areas under consideration. Most are already protected by interim measures, until the final strategy is released.[7].

A protection block offers good quality habitat for caribou and would be given long-term protection for as long as it continues to play its role in the landscape. A protection block may also be a sector frequented by caribou and protected to allow for the species to recover in a better-quality habitat.

[7] See the section on interim measures at: https://mffp.gouv.qc.ca/la-faune/especes/caribou-quebec/amenagement-habitat-caribou-forestier/.

Aggregated cutblocks and residual forest
In HURs and EFAs, spatial distribution of logging sites would be adjusted to allow for single-pass harvests and to facilitate dismantling and reforestation of a significant percentage of the multi-purpose roads built for harvesting. In an aggregated cutblock, harvesting should take place over a period of no more than ten years. The minimum percentage of residual forest[8] to be maintained in each aggregated cutblock (spatial organization compartment or SOC) would be 15%[9] depending on the area. This would help to reduce road network deployment for a single cutting area. The residual forest left standing with this method should be maintained permanently. The method would require a derogation from section 145 of the *Regulation respecting the sustainable development of forests in the domain of the State* (RSDF).

Road network management
In HURs and EFAs, road network deployment and dismantling would be planned carefully, with a view to reducing or limiting increases in disturbance rates, depending on the condition of the area.

Active restoration efforts would be concentrated in HURs. Road dismantling and reforestation would help to reduce permanent habitat disturbances. Road dismantling efforts would focus on non-strategic multi-purpose roads not required to access rights granted in the area concerned. All such work would be preceded by public consultations and consultations with Indigenous communities.

Plans for new logging sites in HURs and EFAs would stipulate, from the outset, that most of the forest roads would be dismantled and reforested after use.

2. General development measures for connectivity zones

The development measures proposed for these zones would be adjusted so as to maintain or restore habitat attributes conducive to caribou movements. Information on connectivity for forest-dwelling and mountain caribou is incomplete, and a knowledge acquisition initiative is currently underway to identify the components that are the most important for connectivity in disturbed landscapes. Until this knowledge is available, good quality, relatively undisturbed habitats would be maintained, and a forest landscape dominated by closed cover stands would also be maintained or restored gradually. In connectivity zones, the spatial organization rules for forests in the bioclimatic domain concerned would apply.

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[8] The term "residual forest" is used to refer to any portion of forest measuring seven metres in height or more that is left standing following a natural disturbance or silvicultural treatment. The residual forest may take the form of large blocks, small clusters, wooded strips and so on. The term is used when analyzing forests at disturbance level.
[9] The minimum figure would be 20% for some areas.

The initial proposed development methods for connectivity zones are as follows:

- Maintenance of quality habitats as long as they fulfill their role, or maintenance of blocks dominated by forest measuring 7 metres or more in height.
- Maintenance of forests measuring 7 metres or more in height across 70% of each connectivity zone.

3. Development methods specific to the Gaspésie HUR

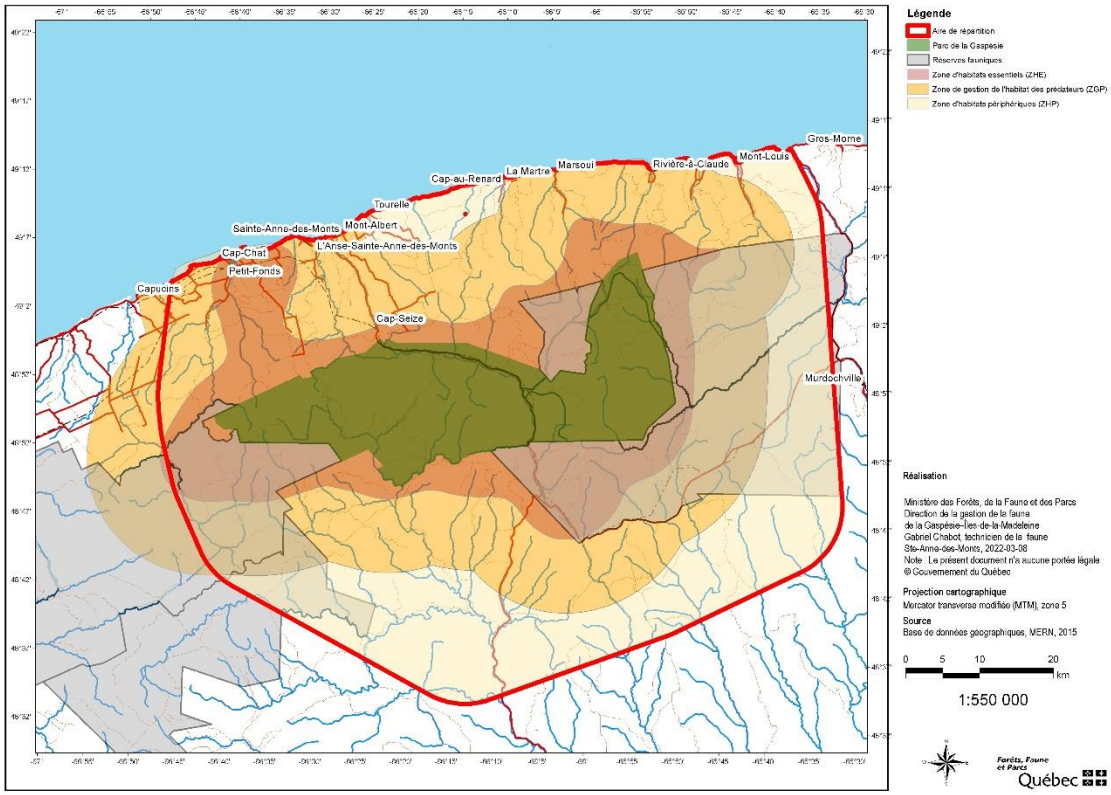
The ecology of the mountain ecotype differs from that of the forest-dwelling ecotype, meaning that a different development approach would be recommended. In the Gaspésie HUR, which is identical for both scenarios (map 4), the area would be divided into three zones, as follows:

- EHZ: Essential habitat zone (burnt orange zone and Gaspésie provincial park)
- PHMZ: Predator habitat management zone (pale orange zone)
- PHZ: peripheral habitat zone (beige zone delimited by the red line)

The essential habitat zone would include the Gaspésie provincial park along with essential habitats at altitude around the park. The predator habitat management zone would surround the essential habitat zone, and development work would aim to maintain or restore habitats that are not suitable to predators and their other prey. The peripheral habitat zone would serve as an additional buffer zone to manage disturbance rates and maintain a softwood forest composition.

In the Gaspésie HUR, disturbances would be managed through active restoration and harvest controls.

Map 4. Proposed zoning for the Gaspésie HUR



7.4. APPENDIX 4

1. Glossary

N.E.: Not evaluated.

Economic spinoffs: Economic impacts include all direct and indirect gains from value creation resulting from economic activity (timber harvesting in this case). The spinoff analysis assesses the impacts of an expenditure, based on the fact that every expenditure constitutes income for someone. This mechanic inevitably converts every expenditure into income. This type of analysis therefore measures the impacts of an expenditure for society. The analysis therefore does not focus on the effectiveness, utility or desirability of an investment, but describes the repercussions of an expenditure for the economic system.

FSPL: Group of softwood species composed of balsam fir, spruce, jack pine and larch.

N.A.: Not applicable.

Added value: Added value is the increase in value of a good or service as a result of processing. For example, the joists produced at a sawmill are worth more than the unprocessed logs that were used as the raw material. Added value is therefore the difference between the value of the product before and after processing. The total added value from all industries in an economy is known as the gross domestic product or GDP.

2. Detailed information on the scenarios

Areas covered by protection blocks. Caribou habitat development measures currently included in the integrated forest development plans consist in protection blocks without protected areas. They include:

- Gaspésie–Bas-Saint-Laurent: The conservation area denoted in the integrated plan.
- Saguenay–Lac-Saint-Jean: The 25-year or longer protection blocks, not including the four blocks that were withdrawn in 2019 (Est-Péribonka, Lemoyne, Framboise and Samaqua).
- Capitale-Nationale: There are no protection blocks in this region. The methods are different to those applicable in protection blocks.
- Abitibi-Témiscamingue (Val-d'Or): Areas to which permanent protection applies.
- Côte-Nord: Protection blocks created for 70 years.
- Nord-du-Québec: Protection blocks applicable for 15 years or more in the Detour sector. The statistic does not include the precautionary approach deployed in the area covered by the adapted forest regime set out in Chapter 3 of the *Paix des Braves*.

For the two hypothetical scenarios, the area covered comprises the long-term protection blocks.

Estimated additional impacts on 2023-2028 allowable cuts. These preliminary impacts were assessed by the Chief Forester using inputs from the 2018-2023 allowable cut calculations. The other data presented (impacts on forest volumes and on economic spinoffs) all result from this assessment. The findings from analyses of final impacts on allowable cuts for the period 2023-2028 are currently being produced and will replace these preliminary assessments.

Number of populations affected by a portion of developed landscape in which habitats are suitable for caribou. Evaluations were not carried out for the Caniapiscau and Basse-Côte-Nord populations, because none or almost none of their ranges are located in the developed forest. The term "portion of developed landscapes in which habitats are suitable for caribou" refers to a landscape of at least 5,000 km² (or a large area adapted to the specific needs of a given population) in which the current and anticipated habitat characteristics, based on the proposed development measures, will be conducive to caribou population self-sustainability. The main characteristics considered were the habitat disturbance rate, the presence of large, virtually undisturbed blocks and maintenance of a softwood forest composition.

Development scenario characteristics. For areas that overlap into two regions (e.g. the Pipmuacan HUR), only the area located in the territory concerned was calculated.

Impacts already included in the allowable cuts (2018-2023)/Impacts of current caribou habitat development measures on 2018-2023 allowable cuts. Impacts of the current caribou habitat development measures on the 2018-2023 allowable cuts, as estimated by the Chief Forester. These protection methods have been incorporated into the integrated forest development plans, the allowable cut calculations and the volumes awarded in supply guarantees for the period in question. The impacts presented do not include those arising from protected areas or from the precautionary approach deployed on the area covered by the adapted forest regime set out in Chapter 3 of the *Paix des Braves*, but they do include the precautionary volume of −52 000 m^3 in Saguenay–Lac-Saint-Jean arising from the new northern limit for timber allocations. Source: FIC-00341_CaribousForestierMontagnards_v4.0.4.pdf

Regional allowable cut for 2018-2023. Regional summary of allowable cuts calculated by the Chief Forester for the period 2018-2023. Source: Synthese_provinciale_mod_mai2020.pdf

Net allocated merchantable volume or net volume available for allocation. These volumes do not include forest biomass volumes associated with branch volumes.

Source, as of September 30, 2021: https://mffp.gouv.qc.ca/forets/amenagement/documents/droits-Quebec.pdf.

Harvested volumes. Average value of harvested volumes (in cubic metres) in the last five years (2016-2017 to 2020-2021). The data were extracted from the Mesubois system on January 12, 2022. Harvested volumes include supply guarantee volumes, volumes sold by contract or at auction, and volumes awarded by permits to supply a processing plant and other types of permits. They also include dry, sound wood and declared volumes of unused ligneous matter.

Impacts on forest volumes. These impacts were calculated using the results of the Chief Forester's preliminary analysis of 2018-2023 allowable cuts. Once the results of the impact analysis of 2023-2028 allowable cuts are known, probably in late February, they will be used for the period 2023-2028.

Economic spinoffs. To perform the economic analysis of scenario impacts, the data were broken down by species based on the species distribution for the 2023-2028 allowable cuts in each development unit concerned – in other words, an approximation of volumes for each species, and not a final estimate. Since the economic spinoff evaluation could not be carried out using net volume figures from the Direction de la gestion de l'approvisionnement en bois (DGAB), an approximate grid of actual usage was used. The usage grid was built from 2018-2023 allowable cut data and an annual average of volumes consumed by mills from 2010 to 2020. The result is therefore an approximation rather than an actual observation of projected usage.

Estimated cost of road dismantling and reforestation. These are estimated costs in the HURs only, and refer solely to the dismantling of existing roads. Costs have not yet been evaluated for the dismantling of future roads, or for roads in extensive favourable areas or connectivity zones. In addition, the costs do not take into account inflation or efficiency monitoring work. Lastly, the cost of other restoration activities (e.g. silvicultural work to counter hardwood encroachment) was not evaluated. In the regional tables and for areas overlapping into two regions, restoration costs are presented for the area as a whole. As a result, the same costs may be used in several different tables, and they cannot be added together.

Estimated annual direct costs for the proposed population management measures, using existing infrastructures. The estimated direct costs for the proposed management measures include remuneration but do not take inflation or efficiency monitoring costs into account. The estimated number of years needed to achieve a habitat disturbance rate of less than 35% was used to estimate the direct costs of implementing and operationalizing the proposed management measures. The variation in the annual direct costs is due to the use of an adaptive management approach. This approach involves continuous monitoring of population status and the impacts of the management measures used, so that adaptations can be made where necessary. Some management measures are single-use measures (e.g. capturing caribou for supplementation), while others (e.g. predator management and adapted management of alternative prey) must be deployed over a period of several years before they will impact population status. In the regional tables and for areas overlapping into two regions, population management costs are presented for the area as a whole. As a result, the same costs may be used in several different tables, and they cannot be added together.

Estimated cost of building large predator-free enclosures. This is the amount that would have to be invested if it becomes necessary to build an enclosure (depending on the efficiency of population management measures – adaptive management).

Possibility of population maintenance. The possibility of maintaining populations was assessed from the probability of maintaining a self-sustaining population, based on anticipated habitat quality over a 50-year timeframe, and presuming that the proposed habitat restoration and population management measures will be effective and ongoing over time, with the necessary effort, as part of an adaptive management approach.

Number of populations covered by the scenarios. Populations not properly covered may disappear, or their range may contract into sectors covered by the protection measures. Although these two possibilities are difficult to predict, population status, habitat distribution and connectivity and the area covered are all likely to play an important role in determining the probability of being able to maintain a population in a smaller range. For example, events will have a more impactful influence on smaller populations than on larger ones that are better able to absorb their consequences.

Percentage of range covered. The caribou range is composed of the Québec portion of all population ranges. Some sectors of these ranges may not be used by the caribou, or may be used sparingly. Only the Québec portion of the Détour, Caniapiscau and Basse-Côte-Nord population ranges has been considered. The percentage of the forest-dwelling caribou range covered by the theoretical scenarios is not the same as the percentage of caribou covered. Caribou distribution throughout the range is inconsistent (meaning that protection for 50% of a range does not necessarily mean protection for 50% of the caribou population that uses it). In addition, the number of caribou tends to diminish further north in the range.

Areas included in protection blocks. The caribou habitat development measures that are currently included in the integrated forest development plans are protection blocks without protected areas. For the two hypothetical scenarios, the area covered is that of the long-term protection blocks.

7.5. APPENDIX 5

This appendix presents the two theoretical, hypothetical scenarios prepared by the Ministère des Forêts, de la Faune et des Parcs.

It is important to note that the two scenarios exclude a large percentage of the forest-dwelling caribou range in the Nord-du-Québec region, because discussions are currently underway with the Crees in connection with the adapted forest regime set out in Chapter 3 of the *Paix des Braves*.

7.5.1. REVISED CONSULTATION SCENARIO

The first scenario is based on the territories considered in 2019[10]. After examining the solutions proposed by the regional operations groups and considering newly available data (caribou population monitoring, lichen maps, disturbance updates, etc.), the MFFP was able to identify the areas of importance within the territories that were originally considered.

This scenario was then adjusted to take the following guidelines into account:

- Scenario adjustments had to be equivalent or superior in terms of fostering self-sustainability for the caribou populations concerned.
- Adjustments must not cause additional social or economic consequences, but should aim to reduce them instead[11].

The revised consultation scenario would provide an adequate level of protection for caribou habitat and would generate social and economic consequences comparable to those for the territories considered in the spring of 2019. Final data will be published when the Chief Forester and the MFFP have completed their calculations.

Main changes to the revised consultation scenario, compared to the territories considered in 2019

The MFFP made some changes to the division proposed in 2019 for some of the regions concerned, in order to reflect the solutions proposed by the regional operations groups.

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[10] The territories under consideration in 2019 did not cover all the areas in which caribou are present. It was already a compromise to consider the caribou issue in land and resource development and usage.

[11] The Val-d'Or is an exception because the territories proposed in 2019, which provided for the continuation of the Val-d'Or wildlife site development plan for 2013-2023, did not foster self-sustainability for the Val-d'Or forest-dwelling caribou population, even if the interim moratorium on logging was maintained across the territory as a whole.

Abitibi-Témiscamingue
The Val-d'Or HUR, covering an area of roughly 5,800 km², was brought into the scenario to replace the caribou wildlife site development plan south of Val-d'Or (2013-2023). The HUR was prepared by the MFFP using an approach similar to that for other HURs. There were no discussions with partners.

Nord-du-Québec
As proposed by the Détour operations group, additional protection blocks were included in the Détour EFA.

Saguenay–Lac-Saint-Jean and Côte-Nord
As proposed by the representatives of the forest industry or by the Innu communities, a number of adjustments were made:

- slight changes to the Manouane and Outardes EFAs
- expansion of the Péribonka and Pipmuacan HUR boundaries
- westward displacement of the Manouane-Péribonka-Ouest connectivity zone
- partial eastward displacement of the Manouane-Pipmuacan connectivity zone
- addition of a connectivity zone between the Pipmuacan HUR and the Akumunan protected area
- enlargement of the protection blocks in the Manouane EFA
- enlargement of the total area of the protection blocks in the Allenou HUR
- reduction of the total area of the protection blocks in the Péribonka and Pipmuacan HURs
- additions and changes to the protection blocks in the Manouane-Péribonka-Ouest and Manouane-Pipmuacan connectivity zones

Capitale-Nationale
The Charlevoix HUR boundaries and development measures have not changed. However, a large portion of the Montmorency Forest (Université Laval's teaching and research forest) is used by the Charlevoix forest-dwelling caribou population. As a result, this area could be incorporated into the Charlevoix HUR, and discussions on this possibility could be held with the area's managers with a view to harmonizing forest development practices.

Bas-Saint-Laurent–Gaspésie
The boundaries of the Gaspésie mountain caribou population's HUR and the applicable development measures have not been changed, because the impacts on timber supplies can be mitigated in other ways.

7.5.2. SCENARIO WITH NO ADDITIONAL IMPACTS FOR FORESTRY

The scenario with no additional impacts for forestry compared to the measures currently included in the integrated forest development plans is based on the revised consultation scenario, from which some areas have been removed due to potential social and economic consequences or because priority has been given to preserving the areas of key importance to the goal of maintaining specific caribou populations.
Habitat management measures have been concentrated in order to consolidate large areas conducive to caribou population maintenance. However, this scenario does not cover some specific populations, including those of Val-d'Or, Charlevoix and Pipmuacan, where the habitats have undergone significant disturbance.

In other words, this scenario proposes to focus the protection effort in areas where the chances of success are greater, with no additional impacts for timber supplies. This scenario is hypothetical, and has been used to identify the investments required and the impacts associated with preserving specific caribou herds.
This scenario, with no additional impacts for forestry, offers an alternative to the current caribou habitat development plans, and would generate impacts for regional timber supplies that will probably be roughly similar to those of the prevailing situation. Analyses are currently being carried out by the Chief Forester to verify this.

The scenario with no additional impacts for forestry is based on the same territorial divisions and uses the same development measures as the revised consultation scenario, but covers a smaller area. Area choices were made on the following basis:

- At the regional level, the chosen EFAs and HURs must not generate additional impacts for timber supplies, over and above the prevailing situation.
- The areas with the greatest potential for caribou population self-sustainability were given priority.

The following areas were removed from the territory covered by the revised consultation scenario:

- the Val-d'Or HUR
- the Charlevoix HUR
- the Péribonka HUR
- the Pipmuacan HUR
- and all connectivity zones

The mountain caribou HUR was retained because the impacts for timber supplies can be mitigated in other ways.

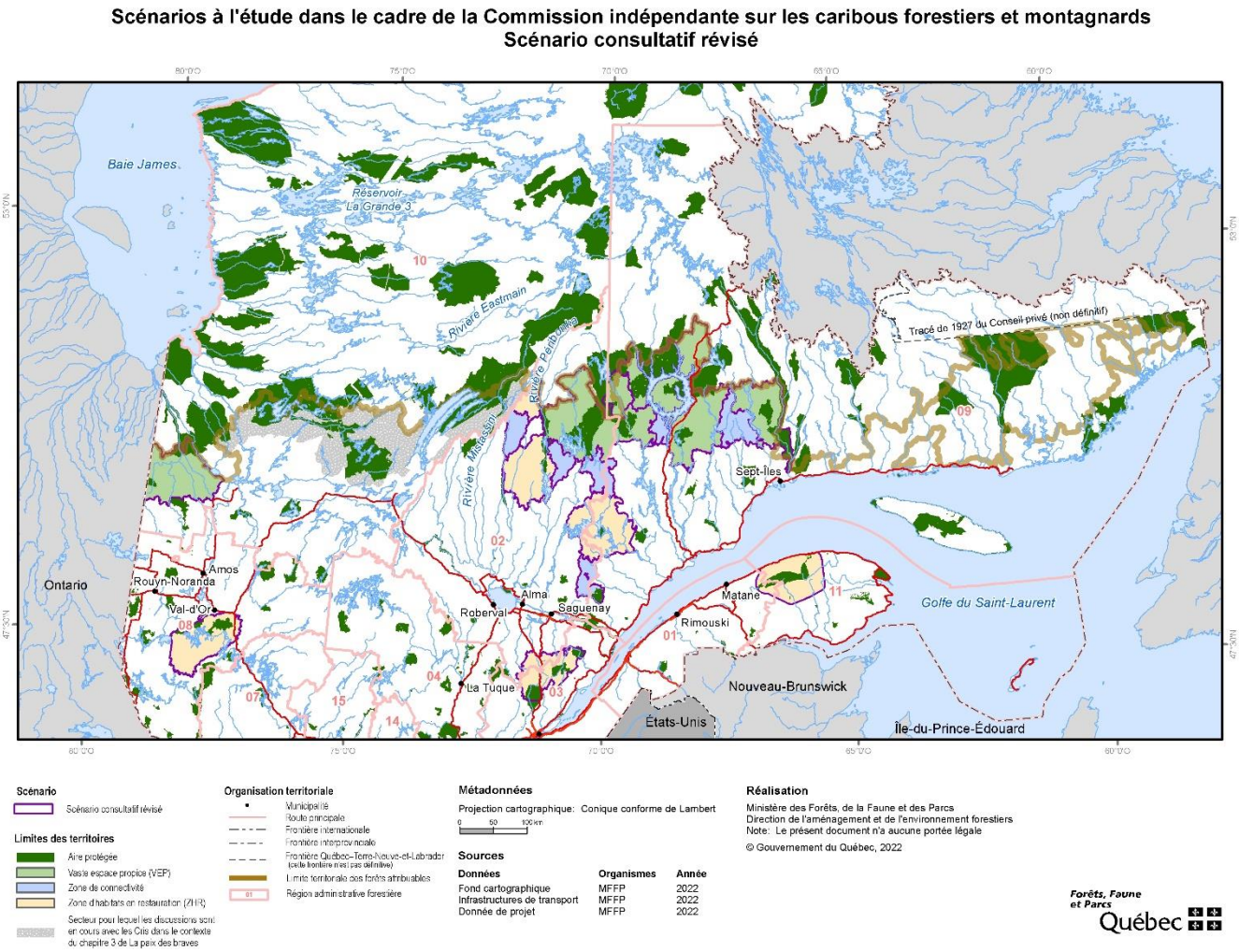
7.5.3. COMPARISON OF SCENARIOS

The two theoretical scenarios can be compared visually or via their forest-related impacts and socio-economic consequences. A number of indicators are available to illustrate them.

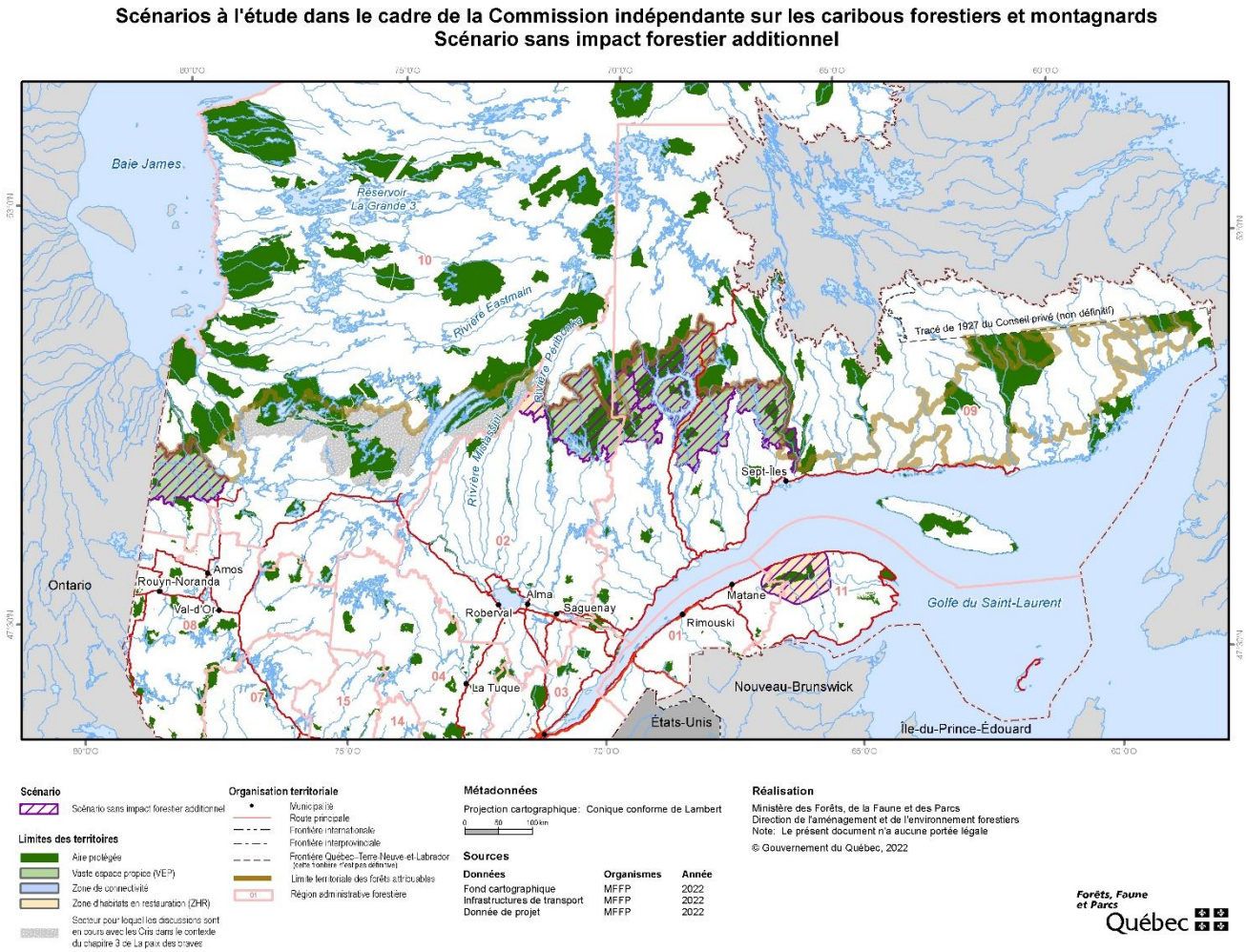
Visual presentation of the two scenarios

Provincially, the two scenarios cover significantly different areas (maps 5 and 6), and the scenario with no additional impacts for forestry focuses the restoration effort in a smaller area.

Map 5. Overview of the revised consultation scenario



Map 6. Overview of the scenario with no additional impacts for forestry



Forest-related and economic impacts of the two scenarios

Table 4. Comparative data on the two theoretical scenarios for all the regions

Indicators	Theoretical scenarios	
	Revised consultation	No additional forestry impact
Percentage of range[12] covered by the scenario	80 %	73 %
Characteristics of the development scenario		
Total area, EFAs	42 318 km²	42 318 km²
Total area, HURs	31 209 km²	6 995 km²
Total area, connectivity zones	10 563 km²	0 km²
Protected areas	13 338 km²	10 868 km²
Long-term protection blocks including protected areas	37 057 km²	23 377 km²
Impacts sur les volumes forestiers		
Allowable cuts, all species	-906 700 m³ gross/yr	+111 000 m³ gross/yr
Volumes available for allocation, FSPL[13]	-631 050 m³ net/yr	N.E.
Total volumes available for allocation	-696 750 m³ net/yr	N.E.
Total allocated volumes	-564 250 m³ net/yr	N. É.[14]
Impacts on economic spinoffs[15,16]		
Direct jobs (estimate)	-841	N. É.
Added value[17]	-96 338 000 $/yr	N. É.
New habitat restoration and management costs		
The cost and duration of recovery and management measures vary from one region to the next. Details can be found in the following subsections.		
Possibility of caribou population maintenance		
Bas-Saint-Laurent, Gaspésie–Îles-de-la-Madeleine	Yes	Yes
Saguenay–Lac-Saint-Jean	Partially	Partially
Capitale-Nationale	Yes	No
Abitibi-Témiscamingue	Yes	No
Côte-Nord	Yes	Partially
Nord-du-Québec[18]	Partially	Partially
Number of populations affected (partially or in their entirety)	12 out of 12	9 out of 12

7.5.4. IMPACTS OF THE TWO SCENARIOS FOR INDIVIDUAL REGIONS

The costs involved in implementing the hypothetical scenarios and their repercussions differ from one region to the next. It is therefore important to show them individually, by region. The scenario without additional forestry impacts proposes to lift the protection measures for the Val-d'Or and Charlevoix populations because habitat restoration in these areas would generate more social and economic consequences.

The following table summarizes the main available data for the two theoretical scenarios, for each of the six regions concerned.

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[12] The forest-dwelling caribou range is composed of the Québec portion of all population ranges (convex polygons, minimum 100%, updated in 2020). The area covered by the scenarios includes the area north of the northern limit for forest allocations, where there are no forestry activities, as well as protected areas and the areas proposed in the scenarios.
[13] Group of softwood species: balsam fir, spruce, jack pine and larch.
[14] Not evaluated.
[15] In 2018 dollars.
[16] Economic impacts include all direct and indirect gains from value creation resulting from economic activity (timber harvesting in this case). The spinoff analysis assesses the impacts of an expenditure, based on the fact that every expenditure constitutes income for someone. This mechanic inevitably converts every expenditure into income. This type of analysis therefore measures the impacts of an expenditure for society. The analysis therefore does not focus on the effectiveness, utility or desirability of an investment, but describes the repercussions of an expenditure for the economic system.
[17] Added value is the increase in value of a good or service due to processing. For example, the joists produced by a sawmill are worth more than the unprocessed logs that were used as the raw material. Added value is therefore the difference between the value of the product before and after processing. The total added value from all industries in an economy is known as the gross domestic product or GDP.
[18] Concerns all the populations in the region.

Table 5. Comparative data for the theoretical scenarios, by region

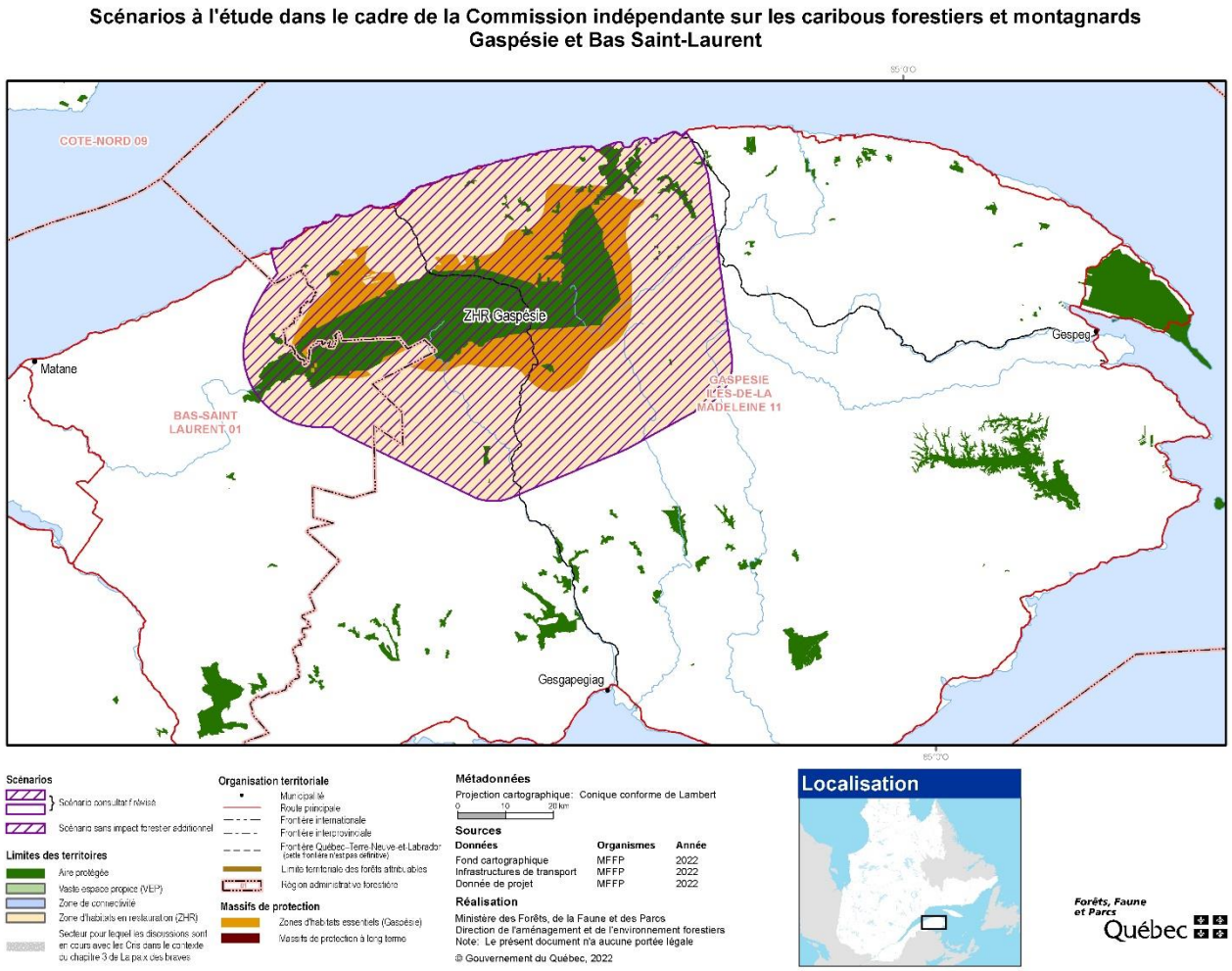
	Regions					
	Bas-Saint-Laurent, Gaspésie–Îles-de-la-Madeleine[19]	**Abitibi-Témiscamingue**	**Capitale-Nationale**	**Saguenay–Lac-Saint-Jean**	**Côte-Nord**	**Nord-du-Québec**
Current forest profile						
2018-2023 allowable cuts, FSPL	2 315 400 m^3 gross/yr	2 471 900 m^3 gross/yr	329 200 m^3 gross/yr	5 747 700 m^3 gross/yr	3 414 600 m^3 gross/yr	3 689 300 m^3 gross/yr
2018-2023 allowable cuts, all species	3 355 700 m^3 gross/yr	4 275 900 m^3 gross/yr	553 800 m^3 gross/yr	7 216 700 m^3 gross/yr	3 806 700 m^3 gross/yr	4 381 800 m^3 gross/yr
Impact of current measures[20]	-155 000 m^3 gross/yr	-40 600 m^3 gross/yr	-19 200 m^3 gross/yr	-171 500 m^3 gross/yr	-454 500 m^3 gross/yr	-31 600 m^3 gross/yr
Impacts on forest volumes[21]						
Revised consultation scenario						
Allowable cuts, all species	0 m^3 gross/yr	-173 000 m^3 gross/yr	+8 000 m^3 gross/yr	-339 000 m^3 gross/yr	-399 300 m^3 gross/yr	-3 400 m^3 gross/yr
Volumes available for allocation, FSPL	0 m^3 net/yr	-101 200 m^3 net/yr	-5 100 m^3 net/yr	-265 200 m^3 net/yr	-254 900 m^3 net/yr	-4 650 m^3 net/yr
Total volumes available for allocation	0 m^3 net/yr	-131 050 m^3 net/yr	+4 400 m^3 net/yr	-295 450 m^3 net/yr	-274 500 m^3 net/yr	-150 m^3 net/yr
Scenario with no additional forestry impacts						
Allowable cuts, all species	0 m^3 gross/yr	+ 41 400 m^3 gross/yr	+73 000 m^3 gross/yr	N.E.	N.E.	-3400
Impacts on economic spinoffs						
Revised consultation scenario						
Direct jobs (estimate)	0	-152	+8	-385	-309	-3
Added value	0 $/yr	-17 335 000 $/yr	+990 000 $/yr	-44 176 000 $/yr	-35 430 000 $/yr	-387 000 $/yr
Scenario with no additional forestry impacts						
Estimation des emplois directs	0	N.E.	N.E.	N.E.	N.E.	-3
Valeur ajoutée	0 $/yr	N.E.	N.E.	N.E.	N.E.	-387 000 $/yr
Proposed habitat restoration and population management measures						
The cost and duration of the restoration and management measures vary from one region to the next. Details can be found in the subsections that follow.						
Estimated impacts on caribou populations						
The indicators used to calculate these impacts vary from one population to the next. Details can also be found in the subsections that follow.						

[19] For these regions, the results of a potential increase in allowable cuts have been interpreted as having no impact on forest volumes.
[20] Impacts of current caribou habitat development measures on 2018-2023 allowable cuts..
[21] Increases in allowable cuts generally result from the removal of caribou habitat development plans (scenario without additional forestry impacts), from measures that are less restrictive for volume availability (e.g. revised consultation scenario for the Capitale-Nationale region) or because of parameters not related to the caribou habitat development measures (e.g. Gaspésie).

Comparative data on the theoretical scenarios for each of the six regions concerned

Bas-Saint-Laurent, Gaspésie–Îles-de-la-Madeleine
The measures in the two scenarios are identical for the Bas-Saint-Laurent and Gaspésie–Îles-de-la-Madeleine regions. The mountain caribou population is confined to the Gaspésie HUR (map 7).

Map 7. Scenarios under consideration for the Bas-Saint-Laurent and Gaspésie–Îles-de-la-Madeleine regions



The current habitat development plan does not contain any population management measures. It focuses mainly on the interim measures implemented in 2017.

The cost of the interim population management measures for the period 2017-2023 is estimated at $5.7 million, broken down into two components:

- $491,000 $ for disturbance reduction and predator management (2017-2021);
- $5.2 million for direct costs in 2021-2023 relating to predator management and the construction and repair of maternity enclosures, related facilities and two years of recurring costs (e.g. caribou food, snow removal, warden salaries, etc.).

The cost of the habitat management measures (past and future) in the period 2017-2023 is estimated at $4.42 million, broken down into three main components:

- aerial spraying of *Bacillus thuringiensis* var. *kurstaki* (*Btk*) against spruce budworm: $2.38 million;
- dismantling of roads: $817,000 (nearly 150 km);
- silvicultural work (land preparation and softwood reforestation) for habitat restoration purposes: $1.22 million.

This region's forest profile (Table 6) would not change much, because, as mentioned previously, special development measures would help to mitigate the impacts of the protection measures.

Table 6. Allowable cuts, volumes available for allocation, allocated volumes and average harvested volumes in the Bas-Saint-Laurent and Gaspésie–Îles-de-la-Madeleine regions

	FSPL	All species
Allowable cuts, 2018-2023	2 315 400 m^3 gross/yr	3 355 700 m^3 gross/yr
Merchantable volume for allocation, 2018-2023	1 938 000 m^3/yr	2 683 200 m^3/yr
Net allocated merchantable volume for 2018-2023, free market	1 837650 m^3/yr	2 502 200 m^3/yr
Average harvested volume (last 5 years)	2 000 188 m^3/yr	2 579 502 m^3/yr

Tableau 7. Données détaillées pour les régions du Bas-Saint-Laurent et de la Gaspésie–Îles-de-la-Madeleine concernées par la population des caribous montagnards

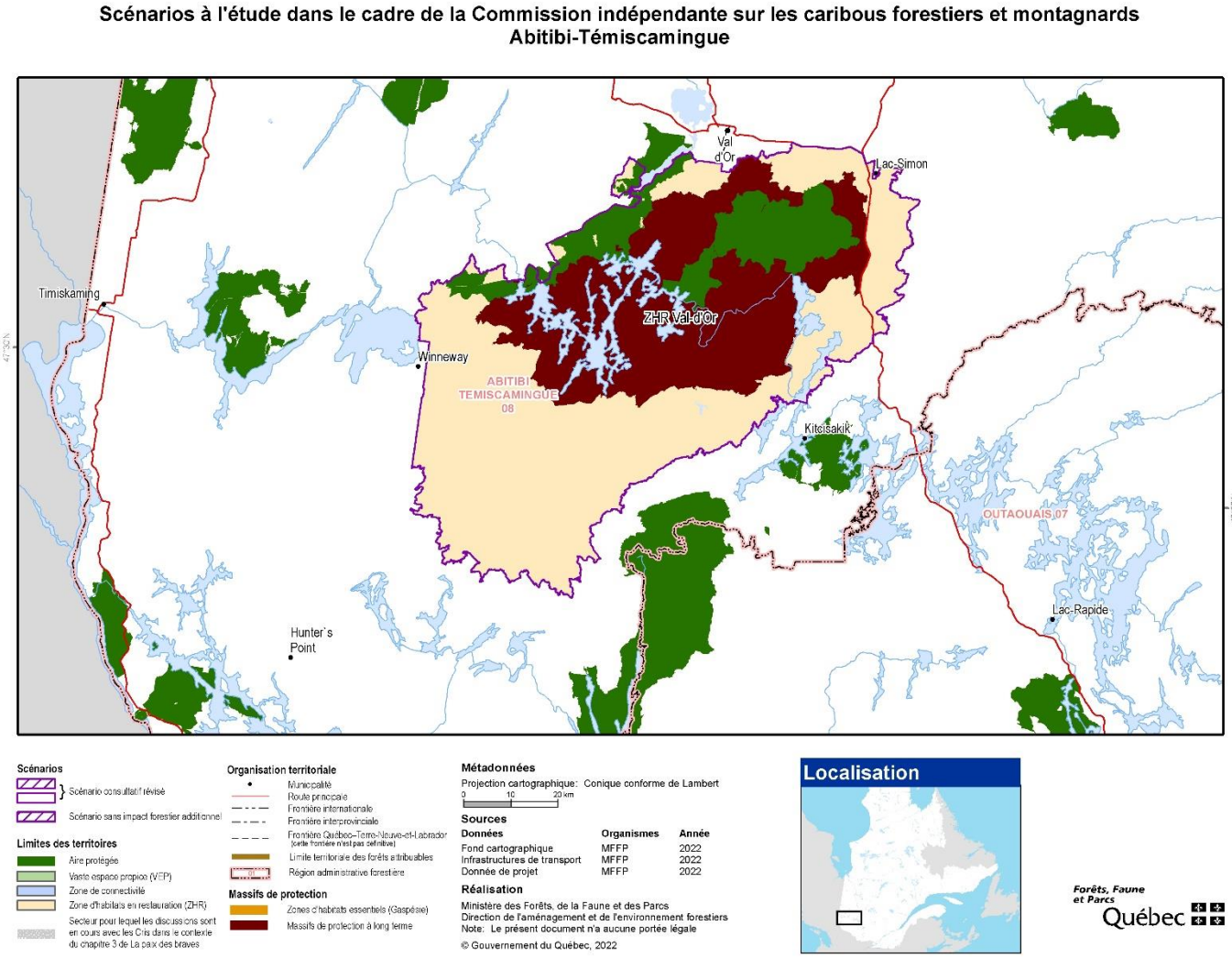
Indicators	Theoretical scenarios
	Revised consultation and no additional forestry impacts
Development scenario characteristics[22]	
Area, HUR	5 601 km²
Protected area	1 013 km²
Long-term protection blocks including protected areas	1 897 km²
Impacts on forest volumes[23]	
Allowable cuts, all species	No impact.[24]
Volumes available for allocation, FSPL	N.A.
Total volumes available	N.A.
Allocated volumes, FSPL	N.A.
Total allocated volumes	N.A.
Impacts on economic spinoffs (in 2018 dollars)	
Direct jobs (estimate)	N.A.
Added value	N.A.
Nouveaux coûts de restauration et gestion de l'habitat	
New habitat restoration and management costs	3 M$ over roughly 10 years
Continuation of the Btk spraying program for spruce budworm (estimated duration: 10 years)	1 M$/yr
Proposed new population management measures	
Estimated direct annual costs for the proposed measures using existing infrastructures (estimated duration: 50 years) • Disturbance reduction (industrial development and recreational/tourism activities) • Adapted management of alternative prey (moose) • Predator management (coyote and black bear) • Two maternity enclosures or two predator-free exclosures • Supplementation	597 k$ to 1.3 M$/yr
Estimated cost of constructing two large exclosures (predator-free) (if necessary)	19.7 M$
Estimated impacts for the caribou population	
Percentage of the population's range covered	100 %
Possible population maintenance	Yes

[22] Characteristics of the development scenario: for areas overlapping into two regions (e.g. Pipmuacan HUR), only the portion of the area in the region concerned was calculated.
[23] The increase in allowable cuts for the scenarios is not necessarily a result of the caribou habitat development measures. It comes mainly from changes to the simulator parameters. Until the final results are received from the Chief Forester, the impacts on forest volumes may potentially be cancelled out for allowable cuts.
[24] Not applicable.

Abitibi-Témiscamingue

There is only one HUR in the Abitibi-Témiscamingue, at Val-d'Or, to protect the Val-d'Or forest-dwelling caribou population. The two theoretical scenarios presented here are very different, since the scenario with no additional forestry impacts does not include the creation of a HUR (map 8).

Map 8. Scenarios under consideration for the Abitibi-Témiscamingue region



The current forest-dwelling caribou habitat development plan does not contain any population management measures. However, interim population management measures were put in place for the period 2017-2023, and the total cost is estimated at $1.68 million. This amount includes:

- $277,000 for enclosures and predator management (2017-2021);
- $1.4 million for direct costs in 2021-2023 for exclosure construction and expansion, related facilities and three years of recurrent expenses (e.g. caribou food, snow removal, wardens' salaries, etc.).

The cost of the habitat management measures (past and future) in the period 2017-2023 is estimated at $512,000, broken down into two components:

- road dismantling: $282,000 (roughly 85 km);
- silvicultural work (land preparation and softwood reforestation) for habitat recovery: $230,000.

The Abitibi-Témiscamingue region's forest profile includes an average harvest level that is very close to the net merchantable volume available for allocation (Table 8). However, the allowable cuts are high, compared to the net volume available for allocation.

Table 8. Allowable cuts, volumes available for allocation, allocated volumes and average harvested volumes in the Abitibi-Témiscamingue region

	FSPL	All species
Allowable cuts, 2018-2023	2 471 900 m^3 gross/yr	4 275 900 m^3 gross/yr
Merchantable volume for allocation, 2018-2023	2 088 400 m3/yr	3 194 350 m3/yr
Net allocated merchantable volume for 2018-2023, free market	2 088 400 m3/yr	3 082 950 m3/yr
Average harvested volume (last 5 years)	1 867 080 m3/yr	2 597 951 m3/yr

Table 9. Comparative data on the theoretical scenarios for the Abitibi-Témiscamingue region concerned by the Val-d'Or population

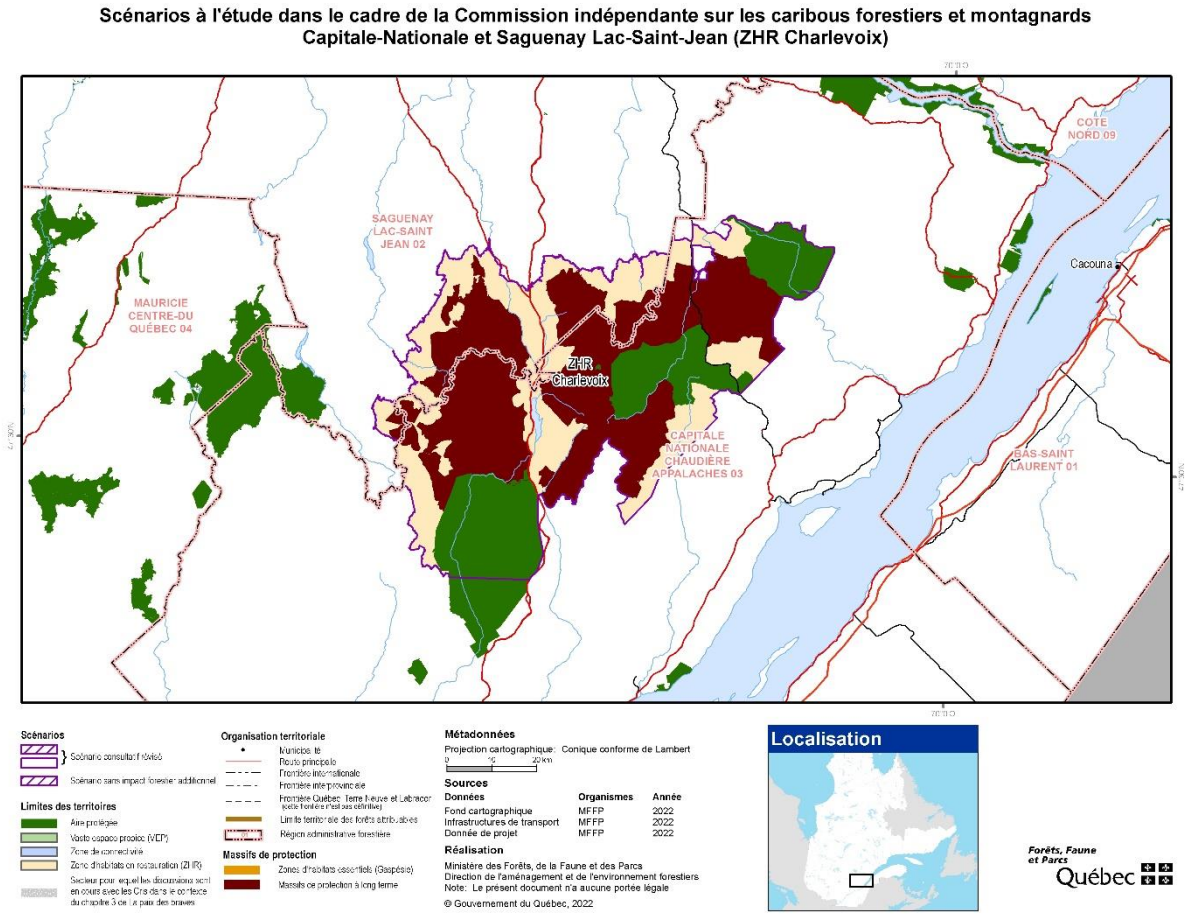
Indicators	Theoretical scenarios	
	Revised consultation	No additional forestry impacts
Development scenario characteristics		
Area, HUR	5 917 km²	N.A.
Area, protected area	712 km²	N. E.[25]
Long-term protection blocks including protected areas	2 485 km²	N.A.
Impacts on forest volumes[26]		
Allowable cuts, all species	-173 000 m³ groos/yr	+ 41 400 m³ gross/yr
Volumes available for allocation, FSPL	-101 200 m³ net/yr	N. E.
Total volumes available	-131 050 m³ net/yr	N. E
Allocated volumes, FSPL	-101 200 m³ net/yr	N. E
Total allocated volumes	-131 050 m³ net/yr	N. E
Impacts on economic spinoffs		
Direct jobs (estimate)	-152	N. E
Added value	-17 335 000 $/yr	N. E
New habitat restoration costs		
Estimated costs for road dismantling and reforestation	6 M$ to 14 M$ in all over 10 years	N.A.
Proposed new population management measures		
Estimated direct annual costs for the proposed measures using existing infrastructures (estimated duration: 50 years) • Disturbance reduction (industrial development and recreational/tourism activities) • Adapted management of alternative prey (moose) • Predator management (wolf and black bear) • Maintenance of predator-free exclosure (small) or predator-free exclosure (large)	160 k$ à 966 k$/yr	N.A.
Estimated cost of constructing a (large) predator-free exclosure (if needed)	10,3 M$	N.A.
Estimated impact on the caribou population		
Percentage of population's range covered	68 %	0 %
Possible to maintain the population	Yes	No

[25] There are some protected areas in the territory that play a role in protecting the caribou, but they have not yet been accounted for.
[26] The impacts on forest volumes may change, depending on the Chief Forester's final results...

Capitale-Nationale

There is only one HUR in the Capitale-Nationale region (the Charlevoix HUR), to protect the Charlevoix forest-dwelling caribou population. The two theoretical scenarios presented here are very different, since the scenario with no additional forestry impacts does not include the creation of a HUR (map 9).

Map 9. Scenarios under consideration for the Capitale-Nationale region



The current forest-dwelling caribou habitat development plan for the Charlevoix HUR does not contain any population management measures. However, interim population measures were put in place in 2017, and the total cost for the period 2017-2023 is estimated at $3.4 million. This amount includes:

- $562,000 for disturbance reduction and predator management (2017-2021);
- $2.9 million for direct costs in 2021-2023 for predator management and exclosure construction and expansion, related facilities and two years of recurrent expenses (e.g. caribou food, snow removal, wardens' salaries, etc.).

The only cost associated with past or future habitat management measures in the period 2017-2023 would be $335,000, for the dismantling of roughly 60 km of roads.

Table 10. Allowable cuts, volumes available for allocation, allocated volumes and average harvested volumes in the Capitale-Nationale region

	FSPL	All species
Allowable cuts 2018-2023	329 200 m^3 gross/yr	553 800 m^3 gross/yr
Merchantable volume for allocation, 2018-2023	295 300 m^3/yr	454 100 m^3/yr
Net allocated merchantable volume for 2018-2023, free market	295 300 m^3/yr	451 750 m^3/yr
Average harvested volume (last 5 years)	235 476 m^3/yr	347 590 m^3/yr

Table 11. Comparative data on the theoretical scenarios for the Capitale-Nationale region concerned by the Charlevoix population/ Charlevoix HUR

	Revised consultation	No additional forestry impacts
Development scenario characteristics		
Area, HUR	4 471 km²	N.A.
Protected area	1 030 km²	N. E.[27]
Long-term protection blocks including protected areas	3 147 km²	N.A.
Impacts on forest volumes[28]		
Allowable cuts, all species	+8 000 m³ groos/yr	+73 000
Volumes available for allocation, FSPL	-5 100 m³ net/yr	N. E.
Total volumes available	+4 400 m³ net/yr	N. E.
Allocated volumes, FSPL	-5 100 m³ net/yr	N. E.
Total allocated volumes	S. O.	N. E.
Impacts on economic spinoffs		
Direct jobs (estimate)	+8	N. E.
Added value	+990 000 $/yr	N. E.
New habitat restoration costs		
Estimated costs for road dismantling and reforestation	9 M$ to 15 M$ in total over roughly 10 years	S. O.
Proposed new population management measures		
Estimated direct annual costs for the proposed measures using existing infrastructures (estimated duration: 50 years) • Disturbance reduction (industrial development and recreational/tourism activities) • Adapted management of alternative prey (moose) • Predator management (wolf and black bear) • Maintenance of predator-free exclosure (small) or predator-free exclosure (large)	220 k$ to 1.7 M$/yr	N.A.
Estimated cost of constructing a (large) predator-free exclosure (if needed)	12.9 M$	N.A.
Estimated impacts on the caribou population		
Percentage of population's range covered	59 %	0 %
Possible to maintain the population	Yes	No

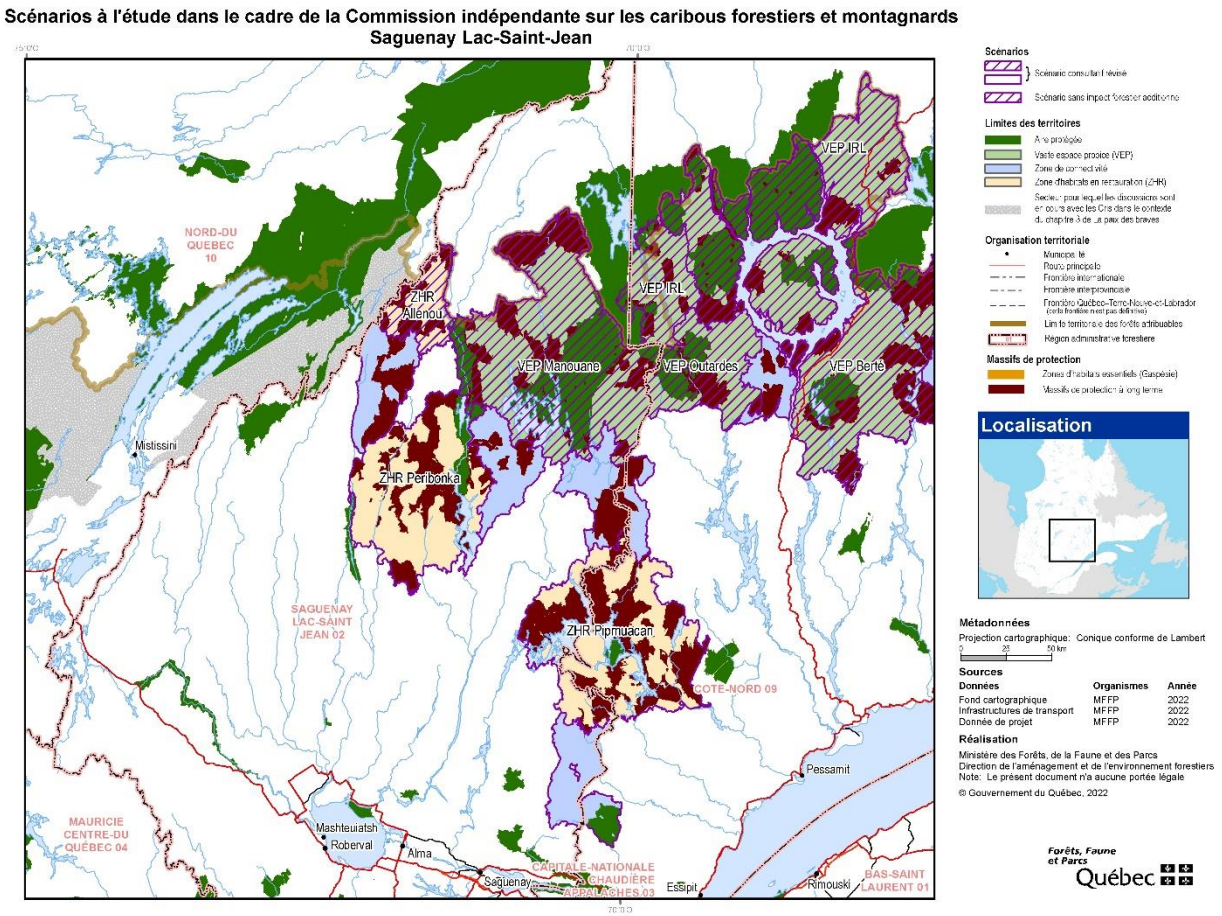
[27] There are some protected areas in the territory that play a role in protecting the caribou, but they have not yet been accounted for.
[28] The impacts on forest volumes may change, depending on the Chief Forester's final results.

Note: The Charlevoix HUR does not include the portion of the population's range that is situated in the Montmorency teaching and research forest (Université Laval). It is also important to note that 24% of the Charlevoix HUR is located in the Saguenay–Lac-Saint-Jean region (development unit 023-71).

Saguenay–Lac-Saint-Jean

The current forest-dwelling caribou habitat development plan for the Saguenay–Lac-Saint-Jean region covers the Témiscamie, Outardes, Pipmuacan and Charlevoix populations[29]. The two hypothetical scenarios for this region are significantly different, because the scenario with no additional forestry impacts proposes to remove the Peribonka, Pipmuacan and Charlevoix HURs, as well as all the connectivity zones (map 10).

Map 10. Scenarios under consideration for the Saguenay–Lac-Saint-Jean region



[29] 24 % of the Charlevoix HUR and 33 % of the Pipmuacan HUR are located in the Saguenay–Lac-Saint-Jean region.

The current interim population management measures for the period 2021-2023 total $2.9 million (Charlevoix HUR). They include direct costs for predator management and for exclosure construction and repairs, related facilities and two years of recurrent expenses (e.g. caribou food, snow removal, wardens' salaries, etc.).

The cost of the habitat management measures (past and future) in the period 2017-2023 is estimated at $872,000 and include dismantling of nearly 120 km of roads.

Saguenay–Lac-Saint-Jean is one of the forestry regions in which the average harvested volume is very close to the allowable cut (Table 12).

Table 12. Allowable cuts, volumes available for allocation, allocated volumes and average harvested volumes in the Saguenay–Lac-Saint-Jean region

	SEPM	Toutes essences
Allowable cuts 2018-2023	5 747 700 m^3 gross/yr	7 216 700 m^3 gross/yr
Merchantable volume for allocation, 2018-2023	5 361 150 m^3/yr	6 279 000 m^3/yr
Net allocated merchantable volume for 2018-2023, free market	5 361 150 m^3/yr	6 296 200 m^3/yr
Average harvested volume (last 5 years)	5 517 133 m^3/yr	6 083 554 m^3/yr

Table 13. Comparative data on the theoretical scenarios for the Saguenay–Lac-Saint-Jean region concerned by the Témiscamie, Outardes, Pipmuacan and Charlevoix populations

Indicators	Theoretical scenarios	
	Revised consultation	No additional forestry impacts
Development scenario characteristics		
Total area, EFAs	9 085 km2	9 085 km2
Total area, HURs	10 554 km2	1 394 km2
Total area, connectivity zones	5 746 km2	0 km2
Total protected areas	2 811 km2	2 440 km2
Long-term protection blocks including protected areas	10 088 km2	5 126 km2
Impacts on forest volumes[30]		
Allowable cuts, all species	-339 000 m3 gross/yr	N.E.
Volumes available for allocation, FSPL	-265 200 m3 net/yr	N.E.
Total volumes available	-295 450 m3 net/yr	N.E.
Allocated volumes, FSPL	-265 200 m3 net/yr	N.E.
Total allocated volumes	-295 450 m3 net/yr	N.E.
Impacts on economic spinoffs		
Direct jobs (estimate)	-385	N.E.
Added value	-44 176 000 $/yr	N.E.
New habitat restoration costs		
Estimated costs for road dismantling and reforestation (Péribonka HUR)	15.5 M$ to 18 M$ in total over roughly 10 years	N.A.
Estimated costs for road dismantling and reforestation (Allenou HUR)	2.5 M$ in total over roughly 10 years	2,5 M$
Estimated costs for road dismantling and reforestation (Pipmuacan HUR)	10 M$ to 14 M$ in total over roughly 10 years	N.A.
Estimated costs for road dismantling and reforestation (Charlevoix HUR)	9 M$ to 15 M$ in total over roughly 10 years	N.A.

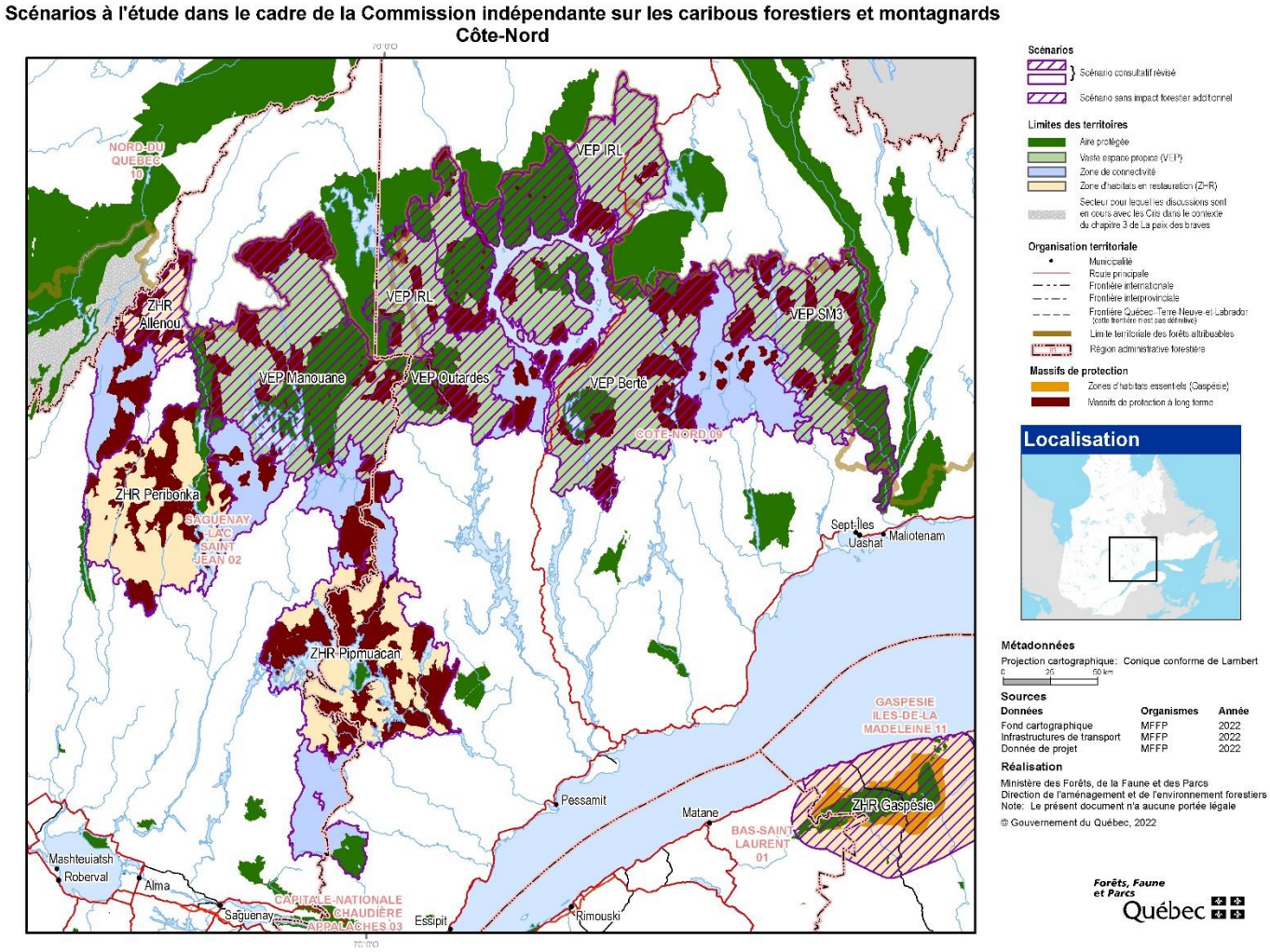
[30] The impacts on forest volumes may change, depending on the Chief Forester's final results.

Proposed new population management measures		
Estimated direct annual costs for the proposed measures (Péribonka HUR) (estimated duration: 25 years) • Disturbance reduction (industrial development and recreational/tourism activities) • Adapted management of alternative prey (moose) • Predator management (wolf and black bear)	676 k$/yr	N.A.
Estimated direct annual costs for the proposed measures (Pipmuacan HUR) (estimated duration: 45 years) • Disturbance reduction (industrial development and recreational/tourism activities) • Adapted management of alternative prey (moose) • Predator management (wolf and black bear)	1.1 M$/yr	N.A.
Estimated direct annual costs for the proposed measures (Allenou HUR) (estimated duration: 50 years) • Disturbance reduction (industrial development and recreational/tourism activities) • Adapted management of alternative prey (moose) • Predator management (wolf and black bear)	464 k$/yr	464 k$
Estimated direct annual costs for the proposed measures using existing infrastructures(Charlevoix HUR) (estimated duration: 50 years) • Disturbance reduction (industrial development and recreational/tourism activities) • Adapted management of alternative prey (moose) • Predator management (wolf and black bear) • Maintenance of predator-free exclosure (small) or predator-free exclosure (large) • Supplmentation	220 k$ à 1.7 M$/yr	N.A.
Estimated cost of constructing a (large) predator-free exclosure (if needed) (Charlevoix HUR)	12.9 M$	N.A.
Estimated impact on the caribou populations		
Number of populations using the region	4	4
Number of populations affected by the scenarios	4	2

Côte-Nord

The Côte-Nord hosts the Outardes, Pipmuacan, Manicouagan, Caniapiscau and Basse-Côte-Nord caribou populations[31]. There are some differences between the two theoretical scenarios for this region; in the scenario with no additional forestry impacts, the Pipmuacan HUR and the connectivity zones have been removed.

Map 11. Scenarios under consideration for the Côte-Nord region



There are no interim population management measures planned for 2021-2023. However, interim habitat management measures (past or future) in the period 2017-2023 cost a total of $394,000. This amount mainly includes dismantling of nearly 77 km of roads.

[31] 67 % of the Pipmuacan is situated in the Côte-Nord region. A portion of the unallocated volume for development unit 093-52 comes from île René-Levasseur. There are a number of issues that may complicate timber harvesting on the island.

Table 14. Allowable cuts, volumes available for allocation, allocated volumes and average harvested volumes in the Côte-Nord region

	FSPL	All species
Allowable cuts 2018-2023	3 414 600 m^3 gross/yr	3 806 700 m^3 gross/yr
Merchantable volume for allocation, 2018-2023	2 839 850 m^3/yr	3 028 000 m^3/yr
Net allocated merchantable volume for 2018-2023, free market	2 420 350 m^3/yr	2 515 150 m^3/yr
Average harvested volume (last 5 years)	1 554 234 m^3/yr	1 659 363 m^3/yr

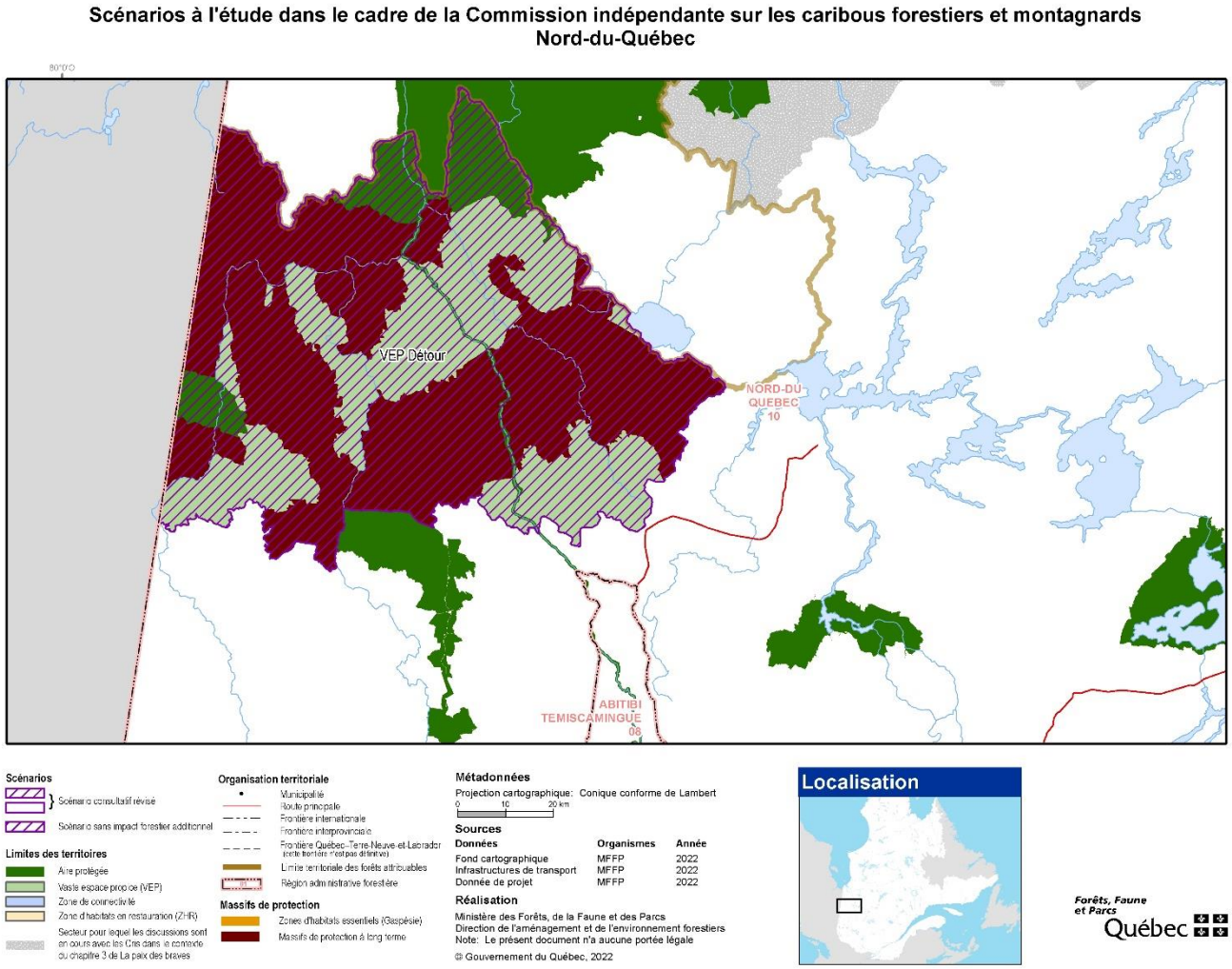
Table 15. Comparative data on the theoretical scenarios for the Côte-Nord region concerned by the Outardes, Pipmuacan, Manicouagan, Caniapiscau and Basse-Côte-Nord caribou populations

Indicators	Theoretical scenarios	
	Revised consultation	No additional forestry impacts
Development scenario characteristics		
Total area, EFAs	26 205 km2	26 205 km2
Total area, HURs	4 666 km2	N.A.
Total area, connectivity zone	4 817 km2	0 km2
Protected areas	7 072 km2	6 715 km2
Long-term protection blocks including protected areas	14 622 km2	11 536 km2
Impacts on forest volumes		
Allowable cuts, all species	-399 300 m3 gross/yr	N.E.
Volumes available for allocation, FSPL	-254 900 m3 net/yr	N.E.
Total volumes available	-274 500 m3 net/yr	N.E.
Allocated volumes, FSPL	-142 000 m3 net/yr	N.E.
Total allocated volumes	-142 000 m3 net/yr	N.E.
Impacts on economic spinoffs		
Direct jobs (estimate)	-309	N.E.
Added value	-35 430 000 $/yr	N.E.
New habitat restoration costs		
Estimated costs for road dismantling and reforestation (Pipmuacan HUR)	10 M$ to 14 M$ in total over roughly 10 years	N.A.
Proposed new population management measures		
Estimated direct annual costs for the proposed measures (Pipmuacan HUR) (estimated duration: 45 years) • Disturbance reduction (industrial development and recreational/tourism activities) • Adapted management of alternative prey (moose) • Predator management (wolf and black bear)	1.1 M$/yr	N.A.
Estimated impact on the caribou populations		
Number of populations using the region	5	5
Number of populations affected by the scenarios	5	4

Nord-du-Québec

The measures proposed in the two theoretical scenarios for the Nord-du-Québec region are identical (map 12) and apply solely to the Detour EFA.

Map 12. Scenarios under consideration for the Nord-du-Québec region



No population management measures (2021-2023) or habitat management measures (2017-2023) are planned in the short term.

The forest profile in the Nord-du-Québec region suggests that there may be a certain amount of latitude for reducing the allowable cut without hindering harvest rates (Table 16).

Table 16. Allowable cuts, volumes available for allocation, allocated volumes and average harvested volumes in the Nord-du-Québec region

	FSPL	All species
Allowable cuts 2018-2023	3 689 300 m^3 gross/yr	4 381 800 m^3 gross/yr
Merchantable volume for allocation, 2018-2023	3 235 450 m^3/yr	3 692 050 m^3/yr
Net allocated merchantable volume for 2018-2023, free market	3 207 300 m^3/yr	3 556 500 m^3/yr
Average harvested volume (last 5 years)	3 016 817 m^3/yr	3 306 319 m^3/yr

Table 17. Comparative data on the theoretical scenarios for the Nord-du-Québec region concerned by the Detour, Nottaway, Assinica and Témiscamie caribou populations[32]

Indicators	Theoretical scenarios
	Revised consultation et No additional forestry impacts
Development scenario characteristics	
Area, EFAs	7 028 km2
Protected areas	700 km2
Long-term protection blocks including protected areas	4 818 km2
Impacts on forest volumes[33]	
Allowable cuts, all species	-3 400 m3 gross/yr
Volumes available for allocation, FSPL	-4 650 m3 net/yr
Total volumes available	-150 m3 net/yr
Allocated volumes, FSPL	-4 650 m3 net/yr
Total allocated volumes	-150 m3 net/yr
Impacts on economic spinoffs	
Direct jobs (estimate)	-3
Added value	-387 000 $/yr
New habitat restoration costs	
(Total $ over roughly 10 years)	N.E.
Proposed new population management measures	
Estimated direct annual costs for the proposed measures	0 $/yr
Estimated impacts on caribou populations	
Number of populations using the region	4
Number of populations affected by the scenarios	2

[32] Other than in a small portion of its range north of the northern limit for timber allocations, the Assinica population is not affected by the theoretical scenarios because it mainly uses land covered by the adapted forest regime (Chapter 3 of the Paix des Braves), for which discussions are currently underway with the Crees. Although the precautionary approach has been implemented in this area, the population is not considered to be affected by the theoretical scenarios. In addition, given that most of the Témiscamie population's range is situated exclusively in sectors covered by the precautionary approach in the Nord-du-Québec region, it is not considered to be affected by this region's scenarios.

[33] The impacts on forest volumes may change, depending on the Chief Forester's final results.

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