



**EVALUATING THE  
FOREST MANAGEMENT  
AND ENVIRONMENTAL  
PERFORMANCE  
OF AGREEMENT AND  
CONTRACT HOLDERS**

**FOR THE FIVE-YEAR PERIOD  
2008-2013,**

**WITH A VIEW TO REVISING  
THE TIMBER VOLUMES  
TO BE ALLOCATED  
IN 2013-2018**

**PUBLIC CONSULTATION  
DOCUMENT**

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**PUBLIC CONSULTATION DOCUMENT**

**Direction de l'aménagement des forêts publiques et privées**

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## Coordination and Text

Luc Bérard, F.Eng., M.ATDR

Ministère des Ressources naturelles et de la Faune  
Service des stratégies d'aménagement  
Direction de l'aménagement des forêts publiques et privées  
Direction générale de la gestion du milieu forestier

## Contributors

Alain Schreiber, Sylvie Delisle, Stéphane Déry, Maryse Dubé, Robert Langevin, Harmel L'Écuyer, Josée Pâquet, Normand Villeneuve, Nelson Fréchette, Léon Beaulieu, Linda Drouin, Ann Soucy, Yves Pomerleau and David Morin.

## French Revision

Marie-France Leblanc

A French version of this document is also available, entitled: *L'évaluation de la performance forestière et environnementale des bénéficiaires de contrats et de conventions au cours de la période quinquennale 2008-2013 pour la révision des volumes de bois à attribuer (2013-2018)*

## English Translation

Christine Gardner

## INTERNET

The consultation document is available on the website of the Ministère des Ressources naturelles et de la Faune at: <http://www.mrnf.gouv.qc.ca/forets/>

## Acronyms

|       |  |
|-------|--|
| TSFMA | Timber supply and forest management agreement      |
| OMF   | Operational management framework                   |
| FMA   | Forest management agreement                        |
| FMC   | Forest management contract                         |
| MRNF  | Ministère des Ressources naturelles et de la Faune |
| PDO   | Protection and development objective               |
| AFMP  | Annual forest management plan                      |
| RCP   | Regional control plan                              |
| GFMP  | General forest management plan                     |
| FFMP  | Five-year forest management plan                   |
| AFMR  | Annual forest management report                    |
| FMU   | Forest management unit                             |

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## Introduction

An initial evaluation of the forest management performance of timber supply and forest management agreement (TSFMA) holders, forest management agreement (FMA) holders and forest management contract (FMC) holders has been carried out by the Ministère des Ressources naturelles et de la Faune (MRNF). The evaluation covers the term of the general forest management plans (GFMPs) for the period 1999-2008. In 2007-2008, the results of the evaluation will be used to revise the volumes of timber to be allocated in the next five-year period (2008-2013). The MRNF is also preparing a second performance evaluation that will be used to revise the timber volumes allocated for the five-year period 2013-2018.

Québec's Consultation Policy on Orientations for the Management and Development of the Forest Environment was adopted by the Government on December 18, 2002. The policy lists the topics that must be submitted for public consultation. They include the criteria and indicators used to evaluate the performance of TSFMA, FMA and FMC holders in the five-year period 2008-2013.

This document presents the indicators that the MRNF intends to select for this second performance evaluation. The MRNF must inform agreement and contract holders of the selected indicators in 2008, before the next set of GFMPs (covering the period 2008-2013) come into force. The consultation provides an opportunity for the various interest groups to become involved in the process of preparing the performance evaluation framework.

This document is divided into three main sections. The first section briefly describes the forest system and summarizes the legal framework governing the evaluation of the forest management and environmental performance of agreement and contract holders. The second section presents the initial performance evaluation, covering the period 1999-2008, which will be used to revise allocations for 2008-2013. The third and last section constitutes the subject of the consultation, and presents the indicators that the MRNF proposes to use for its 2008-2013 performance evaluation, which will be used to revise allocations for the subsequent five-year period (2013-2018). This last section also contains a number of questions designed to elicit opinions on the proposed evaluation approach.

## Section 1 – The Forest System

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### 1.1 A Brief Overview of the Forest System

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Basically, the Minister of Natural Resources and Wildlife is empowered to entrust the management of forest resources to organizations, forestry companies or wood processing mills that obtain their supplies of timber from forests in the domain of the State, by entering into:

- TSFMAs or FMAs in forest management units (FMUs), or
- FMCs in forest reserves.

The timber supplies obtained from public forests are residual volumes established by the Minister, based on the mills' requirements and the availability of other supply sources, such as waste products from other mills and timber from the private forests.

#### 1.1.1 Joint responsibility of the holders of rights in the forest

The forests are divided into FMUs, which serve as a basis for planning forest management activities, calculating the allowable annual cut, setting protection and development objectives (PDOs) for forest resources, and monitoring and controlling the activities carried out in the forest by agreement (TSFMA and FMA) holders.

Agreement holders in the same FMU are jointly responsible for forest management within their unit. Generally speaking, each FMU is shared by several agreement holders.

#### 1.1.2 Rights and obligations of TSFMA holders

A TSFMA authorizes the owner of a wood processing mill to harvest, each year, a specific volume of timber of one or more stipulated species (e.g. fir, birch, maple, etc.), in one or more FMUs, for use at its mill. The volume is established from the allowable annual cut calculated by the Chief Forester. The TSFMA holders who share a FMU must:

- Obtain MRNF approval for a joint GFMP. The GFMP includes the allowable annual cut calculation, the overall forest management strategy (quantity and sequence of silvicultural work), a five-year program of forest management activities, including the activities that the agreement holders intend to carry out to achieve the forest yields ( $m^3/ha$ ) and the PDO targets set by the MRNF. The five-year program must take the needs and expectations of other forest users into consideration;
- Obtain approval for their joint annual forest management plan (AFMP) in order to obtain their annual logging permit. Among other things, the AFMP must describe the forest management activities that the agreement holders intend to carry out during the year. The MRNF ensures that the AFMP is consistent with the five-year program set out in the GFMP;
- Regularly monitor the silvicultural work performed, to ensure that it complies with the rules of good practice, is consistent with the management strategy presented in the GFMP, and is sufficient to achieve the annual forest yields stipulated in the *Forest Management Manual*;
- Obtain approval for their joint annual forest management report (AFMR), which describes the progress made with the management activities presented in the GFMP's five-year program, as well as progress towards achieving the PDO targets.

### **1.1.3 Rights and obligations of FMA holders**

A FMA allows persons who do not operate wood processing mills to harvest trees from forests in the domain of the State. FMAs are granted only where the allowable annual cut so permits. FMA holders share FMUs with TSFMA holders, and are jointly responsible for the forest management performance in their unit.

### **1.1.4 Rights and obligations of FMC holders**

The Minister may allow the harvesting of certain volumes of timber in forest reserves by signing FMCs with interested parties, with a view to fostering regional economic development. FMCs are usually granted to regional county municipalities, municipalities, Aboriginal communities and local companies. Only one FMC is granted in a given area, but it may be signed with several holders. FMC holders have more or less the same obligations as agreement holders.

### **1.1.5 Forest management units**

FMUs were created by an amendment to the Forest Act in 2001. They will replace the present common areas when the next GFMPs come into force on April 1, 2008.

The notion of joint responsibility for agreement holders in the same FMU was also introduced by an amendment to the Act in 2001 (section 35.10). Holders will be held jointly responsible when the next GFMPs come into force.

### **1.1.6 General forest management plan**

The FMU boundaries were published on December 18, 2002, for all areas except those covered by the Agreement Concerning A New Relationship Between the Gouvernement du Québec and the Crees of Québec, which were made public on June 13, 2003. As mentioned earlier, the forthcoming GFMPs, which must be submitted to the Minister for approval by June 1, 2007, will come into force on April 1, 2008. They will be prepared on the basis of the new management units, and all agreement holders in a given FMU will be required to submit a joint plan presenting the allowable annual cut calculation, the overall forest management strategy, the five-year program of management activities and the PDOs set by the Government for that particular FMU.

### **1.1.7 Protection and development objective**

The PDOs that the Minister may set (section 35.6 of the Forest Act) relate to conservation of biological diversity (species and ecosystems), protection of the forest environment (e.g. soil conservation), maintenance or improvement of forest productivity (e.g. site regeneration), maintenance or development of different forest uses, and consideration of the values and needs expressed by the populations concerned. Objectives are set for each management unit, based on the prevailing socio-economic, environmental and forestry conditions.

The Act also states that PDOs are assigned so that they can be included in the GFMP (section 35.7). They must be achievable through the application of forest management activities.

### **1.1.8 Forest environment PDOs for the area covered by the Cree-Québec Agreement**

The Agreement Concerning A New Relationship Between the Gouvernement du Québec and the Crees of Québec provides that the Minister of Natural Resources and Wildlife, when establishing forest environment PDOs, will receive proposals from joint Cree-Québec task forces set up in the communities. The Minister will also consult the Cree-Québec Forestry Board.

## **1.2 The Legal Context Governing Performance Evaluations**

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### **1.2.1 Performance evaluations for revising timber volumes**

Access to wood from the public forest is a privilege that is granted to a limited number of organizations, forestry companies and timber processing mills. Those that enjoy this privilege have a duty to maintain and seek to improve their forest management performance, in order to provide society with a broad range of sustainable socio-economic and environmental benefits.

The notion of performance was introduced into the Forest Act in 2001 by section 77 (see Appendix A of this document). Under section 77, the Minister revises the volumes of timber allocated in the agreements once every five years, based on six criteria:

- Changes in the requirements of wood processing mills;
- Changes in the availability of timber and fibre from supply sources other than the public forests;
- The average annual volume of timber, by origin, used by the mill in recent years;
- Changes to the allowable annual cuts;
- All the forest management activities carried out since the beginning of the period covered by the GFMP, the impact of those activities on the state of conservation of the forest and the forest environment, and the effectiveness of the silvicultural treatments and other protection and conservation measures applied;
- A change or lack of improvement in the performance of a mill with regard to the use of its timber.

The fifth criterion refers in particular to the notion of forest management performance. The evaluation must therefore focus on the forest management activities carried out and their impact on the state of conservation of the forest.

### **1.2.2 Forest management and environmental performance**

Forest management and environmental performance includes conservation of the forest environment and proper application of forest management activities with a view to achieving the forest yields and resource PDOs established by the Minister of Natural Resources and Wildlife for the FMU in question. The performance is evaluated for the area (FMU) as a whole, and is the same for all holders of rights within that FMU.

### **1.2.3 Consequences of an unsatisfactory performance**

The Forest Act sets out the consequences of an unsatisfactory performance, as follows:

- If the forest management and environmental performance is unsatisfactory, the Minister may decide not to increase the timber allocation (section 77.1);

- If the forest management and environmental performance is unsatisfactory, the Minister may reduce the timber allocation or postpone the reduction and impose a remedial program (section 77.3).

#### **1.2.4 General performance for a FMU: Joint responsibility of agreement holders**

TSFMA and FMA holders who share a FMU will be held jointly responsible for forest management in that FMU from April 1, 2008, and will be required to prepare a joint GFMP. All future AFMPs and AFMRs will also be joint, as will their evaluations and any remedial programs. The same applies to the forestry objectives and PDOs established by the MRNF for the GFMP. The agreement holders' performance will be evaluated for the management unit as a whole. In other words, all agreement holders in the management unit will be evaluated together, and will be held jointly responsible for the results.

## Section 2 – The Performance Evaluation for the Period 1999-2008

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### 2.1 The First Performance Evaluation

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In the fall of 2003, the MRNF published its first performance evaluation framework for timber supply and forest management agreement (TSFMA) holders. The document, entitled *Forest Management, Environmental and Industrial Performance – 2005 Evaluation of Timber Supply and Forest Management Agreement Holders and of Forest Management Agreement Holders*, can be consulted on the MRNF website at: <http://www.mrnf.gouv.qc.ca/forets/>. Québec's Consultation Policy on Orientations for the Management and Development of the Forest Environment did not require public consultations on the indicators used for this initial performance evaluation.

The performance of agreement holders over the period covered by the present GFMPs (1999-2008) was evaluated recently, and the results will be used in 2007-2008 to revise the volumes of timber allocated for the five-year period 2008-2013 (i.e. the period covered by the next GFMPs).

The first evaluation, in 2005, covered the 114 common areas, and was based on twelve indicators:

1. Protection of species at risk (i.e. threatened or vulnerable);
2. Protection of exceptional forest ecosystems;
3. Loss of productive areas due to road construction;
4. Areas harvested using regeneration cutting and without rutting problems ;
5. Compliance of forest management activities with the provisions of the Regulation respecting standards of forest management for forests in the domain of the State concerning the protection of water quality and fish habitats;
6. Compliance of forest management activities with the provisions of the Regulation respecting standards of forest management for forests in the domain of the State concerning the protection of wildlife habitats other than fish habitats;
7. Compliance of forest management activities with the provisions of the Regulation respecting standards of forest management for forests in the domain of the State concerning compatibility with the public land use plan;
8. Compliance of commercial silvicultural work (admissible as payment of dues) with the MRNF's acceptability standards;
9. Compliance of non-commercial silvicultural work (admissible as payment of dues) with the MRNF's acceptability standards;
10. Compliance with the Forest Management Manual's requirement concerning planting work and the monitoring of cutting with protection of regeneration and soils;
11. Compliance of planting work and cutting with protection of regeneration and soils with Forest Management Manual standards;
12. Compliance with the harvest volumes stipulated in the annual forest management permit.

## 2.2 Provincial Analysis of Results

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Table 1 shows the breakdown of performance evaluation results by classification. More than 82% of the common areas achieved results in excess of 80%.

Table 1: Breakdown of performance evaluation results by classification

| Classification of Performance Evaluation Results (%) | Frequency (Number of Common Areas) |
|--|------------------------------------|
| From 95 to 100                                       | 8                                  |
| From 90 to 94.9                                      | 35                                 |
| From 85 to 89.9                                      | 25                                 |
| From 80 to 84.9                                      | 24                                 |
| From 75 to 79.9                                      | 18                                 |
| From 70 to 74.9                                      | 1                                  |
| From 65 to 69.9                                      | 1                                  |
| Total number of common areas evaluated               | 112 <sup>1</sup>                   |

The provincial average for the performance evaluation was 86.9%. Regional averages varied from 79.1% (Outaouais) to 90.9% (Bas-Saint-Laurent). It seemed to be more difficult for the hardwood-dominated regions (e.g. Outaouais) to achieve the forest management objectives set by the MRNF, than for the softwood-dominated regions.

Table 2 presents mean average by MRNF administrative region. Appendix B to this document contains the regional results for each indicator.

Table 2: Regional profile of the forest management performance of agreement holders

| MRNF Administrative Region <sup>2</sup> | Number of Common Areas Evaluated | Results (%) |
|---|----------------------------------|-------------|
| 01 – Bas-Saint-Laurent                  | 15                               | 90.9        |
| 02 – Saguenay–Lac-Saint-Jean            | 21                               | 85.7        |
| 03 – Capitale-Nationale and Estrie (05) | 11                               | 83.8        |
| 04 – Mauricie                           | 9                                | 88.8        |
| 06 – Montréal                           | 7                                | 86.3        |
| 07 – Outaouais                          | 11                               | 79.1        |
| 08 – Abitibi-Témiscamingue              | 19                               | 84.6        |
| 09 – Côte-Nord                          | 6                                | 87.2        |
| 11 – Gaspésie–Îles-de-la-Madeleine      | 13                               | 82.2        |
| Mean average by common area             |                                  | 86.9        |

1. Two common areas in the Côte-Nord were not evaluated because forestry activities had not been carried out for several years.

2. The Nord-du-Québec did not exist at the time the evaluations were carried out. The Estrie region is overseen by the Capitale-Nationale office.

No results are shown for certain indicators, including indicator 1 (species at risk), indicator 2 (exceptional forest ecosystems) and indicator 6 (compliance with the Regulation respecting standards of forest management for forests in the domain of the State [wildlife habitat]) (Appendix B). The reason for this is that no activities were carried out in the vicinity of these sites, so no evaluation was necessary. Most of the common area performance evaluations comprise compilations of results for at least eight out of the twelve indicators.

## 2.3 Analysis of Results by Indicator

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The overall results for each indicator were obtained from an analysis of the results compiled for each administrative region.

### 2.3.1 Protection of species at risk (i.e. threatened or vulnerable)

The term “species at risk” means any animal or plant species that is protected or likely to be protected by the Act respecting threatened or vulnerable species and that appears on a list established by ministerial order. Agreement holders must protect all known shelter sites for species at risk that are registered with the *Centre de données sur le patrimoine du Québec*.

#### **Principal observations**

During the evaluation period, forest management activities took place in the vicinity of 12 sites known to host species at risk, in seven different common areas. All the sites received adequate protection, and the agreement holders’ performance was judged satisfactory.

#### **Steps taken to improve future performance**

Current measures have been maintained.

### 2.3.2 Protection of exceptional forest ecosystems

Exceptional forest ecosystems are old-growth forests, rare forests and shelter forests for threatened or vulnerable plant species that are officially classified under the Forest Act, or sites proposed for exceptional forest ecosystem status that have been protected temporarily by the MRNF under an administrative directive. When forest management activities take place in the vicinity of known exceptional forest ecosystems, agreement holders must provide adequate protection. A number of measures exist to protect these forests, including a ban on all forest management activities and the maintenance of wooded buffer strips.

#### **Principal observations**

During the evaluation period, 28 of the 32 exceptional forest ecosystems located in the vicinity of forest management activities received adequate protection. The four that were partially damaged were located in four different common areas. The situation is explained largely by the fact that exceptional forest ecosystems are a new element in the forest system, and very few agreement holders were aware of their existence prior to 2000.

#### **Steps taken to improve future performance**

In recent years, agreement holders have been made aware of the importance of protecting exceptional forest ecosystems and have learned to consider the presence of small protected areas within their management areas. At the same time, the MRNF has introduced more effective ways of conveying

information to its regional offices and to agreement holders, including greater use of geographic information systems.

### **2.3.3 Loss of productive areas due to road construction**

Forest road construction work and certain forest management activities (hauling, lopping, piling, etc.) can result in the loss of productive forest areas. The lost areas include those converted into roads and disturbed roadside areas (baring of mineral soil or rock, ponding and piles of wood residue). The MRNF's goal is to keep these losses to an acceptable level.

Road network density and, to a lesser extent, roadside disturbance levels, are highly dependent on the physical characteristics of the area (e.g. average slopes, type and thickness of surface deposit). Because these characteristics vary by region, it is impossible to set a single standard for the whole of Québec. The MRNF therefore decided to evaluate the performance of agreement holders by comparing the loss of productive area in each territory with the provincial average loss.

#### **Principal observations**

During the evaluation period, the productive area losses in 16 common areas exceeded the regional average by more than 25%.

#### **Steps taken to improve future performance**

The MRNF has adopted the loss of productive area due to road construction as one of its forest resource PDOs. In 2007, a target will be set for each FMU in the 2008-2013 GFMP. The MRNF will then evaluate the extent to which the target has been achieved, and the results may be used to evaluate the overall forest management and environmental performance of agreement holders, which will, in turn, be taken into consideration during the revision of timber volumes when the agreements are extended.

### **2.3.4 Areas harvested using regeneration cutting and without rutting problems**

Repetitive use of heavy machinery disturbs wet soil and sometimes leaves deep, permanent scars known as *ruts*. It is impossible to eliminate rutting (the formation of ruts) altogether from logging sites. However, it can be limited and maintained at an acceptable level.

#### **Principal observations**

In Québec as a whole, an average of 86% of areas logged using regeneration cutting showed little or no evidence of rutting. The lowest average was recorded in Region 08, where 70.4% of sites had few or no rutting problems. It was followed by Regions 02 and 09, where the average was 82.5%. These results are due to the fact that the soils in these three regions are more sensitive to rutting. However, it is important to note that the situation improved significantly after 1998, when the forestry companies became aware of the problem. In region 08, for example, the annual average figure for sites with few or no rutting problems increased from 60% in 1998 to 79% in 2004.

#### **Steps taken to improve future performance**

The MRNF has adopted the reduction of rutting as one of its forest resource PDOs. In 2007, an improvement target will be added to the 2008-2013 GFMPs for all FMUs. The MRNF will then evaluate the extent to which its targets have been achieved, and the results may be used to evaluate the overall forest management and environmental performance of agreement holders, which will, in turn, be taken into consideration during the revision of timber volumes when the agreements are extended.

The MRNF has worked closely with the Forest Engineering Research Institute of Canada to produce a good practice guide designed among other things to reduce rutting in areas logged using cutting with protection of regeneration and soils.

### **2.3.5 Compliance of forest management activities with the provisions of the Regulation respecting standards of forest management for forests in the domain of the State concerning the protection of water quality and fish habitats**

In Québec, companies carrying out forest management activities on land in the domain of the State must comply with the Forest Act and the Regulation respecting standards of forest management for forests in the domain of the State. Every year, the MRNF monitors these requirements, among other things by ensuring that forest management activities comply with aquatic environment protection measures. Compliance with these measures by agreement holders is absolutely crucial if aquatic organisms and their habitats are to be adequately protected. An analysis of compliance is used to evaluate the level of protection given to water quality and the aquatic environment.

#### **Principal observations**

On average, 80 % (weighted rate) of all forest management activities taking place on public land comply with aquatic environment protection standards. This figure is below the alarm threshold of 85% set for this indicator. The highest levels of compliance (84% and 85%) were achieved in Regions 08 and 11 respectively, while the lowest rates were recorded in Regions 04 (69%) and 09 (60%). A detailed analysis of the compliance results suggests that most of the problems were related to standards concerning road networks and avoidance of sedimentation. Steps are therefore required in all the forestry regions to improve compliance with aquatic environment protection standards.

#### **Steps taken to improve future performance**

In 2005, the MRNF established forest resource PDOs that will be incorporated into the next GFMPs. One of the PDOs is to protect the aquatic habitat by avoiding sediment inputs. To achieve this objective, forest companies must ensure that their actions comply with the Regulation respecting standards of forest management for forests in the domain of the State and adopt healthy road infrastructure construction and maintenance practices (roads and culverts). Where necessary, they must demonstrate initiative and propose new methods that will ensure protection of aquatic habitats.

In 2006, the MRNF adopted a new monitoring and control procedure for forest management activities, focusing on those activities with the greatest impact on the aquatic environment, such as road network development. This has allowed it to identify the agreement holders that have the most difficulty in meeting their legal obligations, and to increase its monitoring and control effort accordingly. Where necessary, the MRNF applies incentive and coercive measures to ensure that the agreement holders improve their forestry practices and provide adequate protection for the aquatic environment.

### **2.3.6 Compliance of forest management activities with the provisions of the Regulation respecting standards of forest management for forests in the domain of the State concerning the protection of wildlife habitats other than fish habitats**

Valuable wildlife habitats must be protected. Valuable habitats are those of species such as the heron, muskrat and caribou. They are designated under the Act respecting the conservation and development of wildlife. The Regulation respecting standards of forest management for forests in the domain of the State contains several measures designed to protect wildlife habitats (other than fish habitats), such as buffer strips, periods of the year when forest operations must cease, and the maintenance of a given stand structure or composition where forest operations are permitted.

### **Principal observations**

In Québec as a whole, 97% of forest activities comply with regulatory provisions concerning the protection of wildlife habitats other than fish habitats. The performance of agreement holders is therefore judged satisfactory.

### **Steps taken to improve future performance**

Current measures have been maintained.

## **2.3.7 Compliance of forest management activities with the provisions of the Regulation respecting standards of forest management for forests in the domain of the State concerning compatibility with the public land use plan**

Other forest uses must be taken into consideration during forest management. The Regulation respecting standards of forest management for forests in the domain of the State provides for the protection of certain land uses (e.g. cottages, snowmobile and ATV trails, archaeological sites, ecological sites, campsites, drinking water outlets, etc.). These uses are included in the official public land use plan or in the plan as modified by the MRNF's management units, and must be taken into account at the forest management activity planning stage.

### **Principal observations**

In Québec as a whole, 98% of forest activities comply with regulatory provisions concerning the protection of other land uses. The performance of agreement holders is therefore judged satisfactory.

### **Steps taken to improve future performance**

Current measures have been maintained.

## **2.3.8 Compliance of commercial silvicultural work (admissible as payment of dues) with the MRNF's acceptability standards**

Agreement holders harvest volumes of wood by carrying out commercial silvicultural work. Most of this work, including selection cutting, commercial thinning, strip cutting and so on, is admissible as payment of cutting rights (dues). This indicator is used to evaluate the work that is eligible as payment of dues.

### **Principal observations**

In Québec as a whole, 89% of the areas logged using this type of treatment fulfill the criteria for admissibility as payment of dues. However, the hardwood-dominated forestry regions, including Outaouais (60%) and Montreal (74%) do not perform quite as well. This is explained largely by the fact that agreement holders find it difficult to organize their forestry work to carry out the various types of selection cutting in accordance with MRNF standards.

### **Steps taken to improve future performance**

The MRNF is in the process of establishing new approaches to hardwood forest management, and is increasingly likely to authorize alternative treatments that can be adjusted to the variability of hardwood forests. The MRNF plans to identify types of forests (forest zoning) in which selection cutting will be the preferred approach for ecological and economic reasons. The application of a management-by-objectives approach should grant more flexibility to the MRNF and agreement holders alike than would be the case with a rigid normative framework, by permitting the use of a more finely-developed form of silviculture that can be adjusted to forest type and harvestable wood quality.

### **2.3.9 Compliance of non-commercial silvicultural work (admissible as payment of dues) with the MRNF's acceptability standards**

Agreement holders are required to carry out non-commercial silvicultural work (i.e. operations not involving commercial timber harvesting). This work is admissible as payment of cutting dues (pre-commercial thinning, planting, stand release, etc.).

#### **Principal observations**

In Québec as a whole, 97% of the areas in which this type of treatment is applied meet the criteria for admissibility as payment of dues. The performance of agreement holders is therefore considered highly satisfactory.

#### **Steps taken to improve future performance**

No special measures are necessary.

### **2.3.10 Compliance with the Forest Management Manual's requirements concerning the monitoring of planting and cutting with protection of regeneration and soils**

Agreement holders must monitor the forestry work carried out in previous years, according to a schedule set out in the *Forest Management Manual*. This indicator is used to assess whether or not agreement holders have complied with the monitoring schedule applicable to planting work and cutting with protection of regeneration and soils.

#### **Principal observations**

In Québec as a whole, 94% of the areas treated in previous years were monitored by agreement holders within the timeframe set out in the *Forest Management Manual*. However, the results recorded in two administrative regions - Côte-Nord (77%) and Outaouais (79%) – were much less satisfactory. Elsewhere, the performance of agreement holders was judged to be satisfactory. The results for seven common areas were rejected due to the fact that the MRNF did not have sufficient data to evaluate the real performance of agreement holders.

#### **Steps taken to improve future performance**

At the annual planning stage, the MRNF ensures that the agreement holders in question make up any deficits in their monitoring of areas treated in previous years. Agreement holders who do not carry out the required monitoring will be obliged to pay a third party appointed by the MRNF to do so in their place.

### **2.3.11 Compliance of planting work and cutting with protection of regeneration and soils with *Forest Management Manual* standards**

Agreement holders must monitor the forestry work carried out in previous years and ensure that it has the anticipated impact in terms of achieving the forest yields set out in the *Forest Management Manual*, which describes the criteria required. The preceding indicator was used to see whether agreement holders had complied with monitoring deadlines; this one is used to see whether the yield criteria set out in the *Forest Management Manual* for planting work and cutting with protection of regeneration and soils have been achieved at the end of the proposed timeframe (e.g. 8, 10 or 15 years after cutting).

### **Principal observations**

In Québec as a whole, the *Forest Management Manual* criteria were achieved in 72% of previously treated areas that had been monitored. There were considerable differences between the regions, with results ranging from 46% for the Capitale-Nationale region to 99% for the Montreal and Côte-Nord regions.

### **Steps taken to improve future performance**

In the areas where the *Forest Management Manual* criteria were not achieved, the MRNF will ensure that agreement holders carry out the necessary forest management activities in the following year.

## **2.3.12 Compliance with harvest volumes stipulated in the annual forest management permit**

The annual forest management permit sets out the volume of wood that may be harvested for each species or group of species. This indicator allows the MRNF to compare the volume authorized in the permit with the volume allocated in the agreement. The harvested volume includes:

- The volume of wood actually scaled (including estimates) and transported to the processing mills;
- The volume of wood abandoned on logging, piling, lopping and slashing sites, and the volume of unlogged wood in forest pockets that should have been cut.

The results of this indicator show whether or not the companies in the common area have exceeded or complied with the volumes authorized in their permits, including volumes left on logging, piling, lopping and slashing sites and in unlogged forest pockets.

### **Principal observations**

A result of 100% means that volumes for the species or group of species have not been exceeded. The MRNF tolerates slight overlogging of between 100 and 200 m<sup>3</sup>. A result of 75% may mean that overlogging has taken place during the year, but that a balance has been achieved over the evaluation period as a whole. A result of 50% may mean that overlogging is frequent, recurrent and cumulative over the evaluation period.

The results show that the volumes of wood scaled (including estimates) and transported to the processing mills generally comply with the volumes authorized in the permits. However, when the volumes left on logging sites or in unlogged forest pockets are counted, the total volume harvested is in excess of the authorized volume. Unlogged forest pockets are verified by the MRNF in the year following forestry work, and agreement holders are obliged to return to the site and log them.

In Québec as a whole, the overall result for this indicator was 74%. The broad range of results and means (e.g. a mean of 66% for Outaouais and 94% for Côte-Nord) can be explained at least in part by the low level of tolerance for overlogging. The performance evaluation for the Mauricie region did not include this indicator due to insufficient information.

### **Steps taken to improve future performance**

Before granting annual logging permits, the MRNF will pay special attention to volumes left on logging sites or in forest pockets, and where necessary will take them into account when establishing the volumes authorized in the permits.

### 2.3.13 General conclusion

The performance of agreement holders ranges from satisfactory to very satisfactory. However, in some common areas the MRNF will, in future, be paying special attention to the following elements:

- Compliance with regulations concerning the protection of water quality and fish habitats;
- Forest management work in hardwood forests in Southern Québec, where agreement holders find it difficult to organize their forestry activities, in particular the various types of selection cutting;
- Monitoring carried out by agreement holders to ensure that work done in previous years has achieved the yield criteria set out in the *Forest Management Manual*;
- Past volumes left on logging sites and in unlogged forest pockets, prior to stipulating the annual authorized volumes in annual logging permits.

## Section 3 – Forest Management and Environmental Performance in the Period 2008 to 2013

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This section constitutes the subject of the consultation. Previous sections present the general context surrounding performance evaluations, and do not form part of the consultation. In section 3.1.4, a series of questions is used to structure the consultation and target the aspects on which we would like to receive opinions and comments.

The performance evaluation framework for TSFMA, FMA and FMC holders presented in this section will apply to the review of allocations for the five-year period 2013-2018. The review itself will be carried out in the year preceding the beginning of that period, i.e. in 2011-2012; the MRNF will evaluate the performance of agreement holders based on the results of the preceding five-year period, i.e. 2008 to 2013.

### 3.1 The Performance Evaluation Method

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#### 3.1.1 Criteria for the selection of performance indicators

The performance of all agreement holders in a given FMU will be established using a series of indicators. An indicator is a quantitative variable that usually produces a ratio illustrating a situation or a performance in a desired situation. The use of indicators ensures that evaluations are objective in nature.

The following considerations were used when selecting performance indicators:

- The selection focused on indicators that have previously been used by the MRNF, for example in its audit activities;
- Indicators are required to assess compliance with legal, regulatory and contractual obligations;
- Indicators are required to assess forest management activities carried out by agreement and contract holders;
- The selected indicators should reflect the impact of forest management activities on forest conservation;
- The selected indicators should reflect the main concerns of the MRNF, community organizations and the general public.

Given that the evaluation will be carried out in the last-but-one year of the five-year period, the indicators must obviously measure annual targets rather than five-year targets. They must be equal in importance and provide data and results covering the period under evaluation in all FMUs in Québec. The quantitative result for each indicator must be clear, accurate and reliable. It must not be an estimate and must not be subject to interpretation or likely to generate confusion. Indicators should be suitable for evaluating the performance of all agreement holders in every FMU, since they are jointly responsible for the results in their respective FMUs. The method used to evaluate the results of an indicator should remain as stable as possible throughout the evaluation period.

### 3.1.2 Proposed indicators

The proposed indicators were derived from the process used to verify the activities of agreement holders. To keep things as consistent, effective and simple as possible, the MRNF intends to use the results of its verifications (regional control plans or RCPs) to evaluate forest management and environmental performance. This approach will facilitate matters for the MRNF regional office personnel who will be responsible for producing the performance evaluation reports.

The indicators already used by the MRNF for its RCPs cover a variety of activities. Other indicators, including those used for the PDOs<sup>3</sup>, will be added to the verification process (RCP) in 2008-2009, for the five-year period 2008-2013.

#### **Relationship between the RCPs, the operational management framework and the performance evaluation**

Ever since 2005-2006, the MRNF's RCPs have been based on the management of activity-related risk and on the previous performance of agreement holders. For example, the RCPs allow the MRNF to identify the forest companies that have the most difficulty or run the greatest risk in fulfilling their legal and contractual obligations each year. Each year, for each activity that is verified (e.g. silvicultural work, volumes of wood harvested, compliance with forest management standards [Regulation respecting standards of forest management for forests in the domain of the State], etc.), the MRNF classifies the companies into three performance categories. The category determines the intensity of the verification activity for that particular company. In other words, the least effective companies are verified more intensively, and the results are used to document any offences and establish any penalties.

The MRNF's operational management framework (OMF) is also based on the results of the RCP indicators. Its purpose is to establish an annual corporate profile of every contract or agreement holder operating in the public forest, and to determine the annual performance of the group of agreement holders in a given FMU. The framework includes incentive and coercive measures that the MRNF will apply to companies that perform poorly.

These two management tools – the RCP and the OMF – are usually sufficiently restrictive to ensure that agreement and contract holders improve their forest management performance. However, despite the MRNF's best efforts, this is sometimes not the case, and where this occurs, section 77 of the Forest Act allows the MRNF to take action in respect of the volume of wood allocated to the offending companies at the time of the five-year review of allocations.

Table 3 presents the activities and indicators selected to evaluate the performance of agreement holders in the next five-year period (2008-2013). Some of the MRNF's current verification indicators have not been chosen because they cannot be used to assess the impact of certain activities on forest conservation. For example, pre-logging tree marking was excluded because it does not show the state of the forest after logging has taken place. Appendix C contains a description of the proposed indicators and a brief overview of how they will be calculated.

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3. Public consultations were held in respect of the PDOs in 2003. The targets to be achieved for each FMU will be set by the MRNF and included in the 2008-2013 GFMPs.

Table 3: Proposed indicators for the performance evaluation in the period 2008-2013

| ACTIVITIES   | INDICATORS  |
|--|---|
| <b>Environmental Indicators (E)</b>  |   |
| Maintenance of mature and overmature forests   | E1 Rate of application of proposed measures (biological refuges, extended rotation patches and adapted silvicultural practices) to ensure permanent maintenance of mature and overmature forests (PDO)                              |
| Protection of conservation areas   | E2 Rate of protection of areas to which conservation measures apply (includes certain PDOs)   |
| Conservation of deadwood in forests under management   | E3 Rate of application of proposed measures to preserve deadwood in forests under management (PDO)  |
| Erosion associated with the road network   | E4 Average number of cases of erosion observed on the road network, by bridge or culvert (PDO)  |
| Regulation respecting standards of forest management for forests in the domain of the State and the protection of aquatic habitats | E5 Rate of compliance of forest management activities with aquatic environment protection standards   |
| <b>Forest Management Indicators (F)</b>  |   |
| Silvicultural work carried out   | F1 Rate of compliance of partial cuts (after treatment)<br>F2 Rate of compliance of targeted non-commercial silvicultural treatments (after treatment)  |
| Monitoring stipulated in the <i>Forest Management Manual</i> <sup>4</sup>  | F3 Weighted score for <i>Forest Manual Management</i> monitoring  |
| Loss of timber (residues)  | F4 Volume of residues <sup>5</sup> for evaluation of volumes affected by logging operations   |
| Measures to harmonize different forest uses  | F5 Rate of compliance of forest management with usage harmonization measures (PDOs)<br>F6 Rate of compliance of forest management with usage harmonization measures associated with Aboriginal community relations (includes a PDO) |

Indicators F5 and F6, along with most of the environmental indicators, are currently being prepared and will be introduced into the MRNF's activity verification process (RCP) in 2008-2009.

The MRNF may add any other indicators it feels are important to evaluate the performance of agreement holders.

4. The *Forest Management Manual* describes the methods used to audit silvicultural treatments applied with a view to achieving yields.

5. Residues are volumes of wood abandoned on logging, piling, lopping and slashing sites and in unlogged forest pockets.

**Indicators that will be used to review timber allocations for the following five-year period (2018-2023)**

Because the next performance evaluation will be carried out in 2011-2012, before the end of the five-year period being evaluated (2008-2013), the final indicator results required to evaluate achievement of the five-year targets will not be available. Indicators for certain PDOs with five-year targets can therefore not be used to revise allocations for the period 2013-2018, but will be available for the following five-year period (2018-2023). However, in 2008, the MRNF will carry out the monitoring and control activities required to use the results of those indicators not only for the 2008-2009 RCPs, but also for the revision of allocations in the following five-year period (2018-2023).

The PDO indicators with five-year targets are:

- E6 Percentage of regeneration cuts disturbed by ruts (PDO);
- E7 Loss productive forest area associated with the road network.

Appendix D contains descriptions of these two indicators and a brief overview of the calculation methods.

### **3.1.3 Overall performance evaluation method**

Performance is evaluated for each FMU as a whole, since agreement holders are jointly responsible for the results obtained during the period under evaluation.

The MRNF audit activity database will be used to evaluate forest management and environmental performance.

#### **Performance evaluation for each indicator**

Some agreement holders manage larger areas, or harvest larger quantities of wood, than other holders. The annual data for all agreement holders in the same FMU will be added together to reflect the weight of each holder's relative contribution to the forest management activities.

The targets to be achieved will normally be communicated along with approval for the forthcoming joint GFMPs (April 1, 2008), and may vary from one FMU to the next. This will be the case for the PDOs. The thresholds for other targets will be set annually, depending on the MRNF's joint performance expectations.

The result obtained will then be compared with the targets or thresholds. Existing targets and thresholds will be used. Table 4 shows how the result obtained for each indicator will be rated for performance (ratings of 1 to 3). The rating system, which is already in use at the MRNF, can easily be adjusted to any changes made during the period to the targets, thresholds or result calculation methods.

Table 4: Example of an annual performance rating for all agreement holders in a given FMU, for a given indicator (e.g.: 80% threshold)

| Rating | Annual result obtained for all agreement holders in the FMU | Possible interpretations                         |
|--------|---|--|
| 1      | More than 80%   | Target achieved                                  |
| 2      | Between 70% and 80%   | Target not achieved                              |
| 3      | Less than 70%   | Target not achieved and result well below target |

### Periodic evaluation for each field

Given the large number of indicators, and given that the MRNF regards forest management performance and environmental performance as being on an equal footing, we propose an intermediary compilation for these two fields (forest management and environment), as follows:

- All the indicators in a field have an identical relative weighting. Depending on the values, it is difficult to establish a relative weighting that will satisfy all groups.
- The periodic rating for each field will be obtained by carrying out the following steps:
  1. Calculation of the periodic rating for each indicator (mean average)
  2. Calculation of the periodic rating for all indicators (mean average)

Table 5 illustrates this method.

Table 5: Fictional example of a periodic compilation of results in each field for all agreement and contract holders in a given FMU

| <b>Forest Management Indicators</b>               |                     |        |                                  |        |                                 |        |                        |        |                               |        |  |        |  |
|---|---------------------|--------|----------------------------------|--------|---------------------------------|--------|------------------------|--------|-------------------------------|--------|--|--------|--|
| <b>Fiscal Year</b>                                | <b>F1</b>           |        | <b>F2</b>                        |        | <b>F3</b>                       |        | <b>F4</b>              |        | <b>F5</b>                     |        | <b>F6</b>                                |        | <b>Average periodic rating for the field</b> |
|   | <b>Partial cuts</b> |        | <b>Non-commercial treatments</b> |        | <b>Forest Management Manual</b> |        | <b>Forest residues</b> |        | <b>Harmonization measures</b> |        | <b>Aboriginal harmonization measures</b> |        |  |
|   | Results (%)         | Rating | Results (%)                      | Rating | Results (%)                     | Rating | Results (%)            | Rating | Results (%)                   | Rating | Results (%)                              | Rating |  |
| 2008-2009   | 84                  | 2      | 86                               | 1      | 88                              | 1      | 87                     | 1      | 93                            | 1      | 87                                       | 1      | <b>1.30</b>                                  |
| 2009-2010   | 91                  | 1      |                                  |        | 86                              | 1      | 84                     | 2      | 89                            | 1      | 86                                       | 1      |  |
| 2010-2011   | 87                  | 1      | 65                               | 2      | 90                              | 1      | 92                     | 1      | 83                            | 3      | 97                                       | 1      |  |
| 2011-2012 <sup>6</sup>                            | n. a.               | n. a.  | n. a.                            | n. a.  | n. a.                           | n. a.  | n. a.                  | n. a.  | n. a.                         | n. a.  | n. a.                                    | n. a.  |  |
| 2012-2013   | n. a.               | n. a.  | n. a.                            | n. a.  | n. a.                           | n. a.  | n. a.                  | n. a.  | n. a.                         | n. a.  | n. a.                                    | n. a.  |  |
| <b>Average periodic rating for each indicator</b> | ---                 | 1.33   | ---                              | 1.50   | ----                            | 1.00   | ---                    | 1.33   | ---                           | 1.66   | ---                                      | 1.00   |  |

| <b>Environment Indicators</b>                     |                                      |        |                              |        |                 |        |                |        |  |        |  |  |  |
|---|--------------------------------------|--------|------------------------------|--------|-----------------|--------|----------------|--------|--|--------|--|--|--|
| <b>Fiscal Year</b>                                | <b>E1</b>                            |        | <b>E2</b>                    |        | <b>E3</b>       |        | <b>E4</b>      |        | <b>E5</b>                                |        | <b>Average periodic rating for the field</b> |  |  |
|   | <b>Mature and overmature forests</b> |        | <b>Conservation measures</b> |        | <b>Deadwood</b> |        | <b>Erosion</b> |        | <b>Protection of aquatic environment</b> |        |  |  |  |
|   | Results (%)                          | Rating | Results (%)                  | Rating | Results (%)     | Rating | Results (%)    | Rating | Results                                  | Rating |  |  |  |
| 2008-2009   | 84                                   | 2      | 97                           | 1      | 88              | 1      | 87             | 1      | 56                                       | 3      | <b>1.80</b>                                  |  |  |
| 2009-2010   | 91                                   | 1      | 87                           | 1      | 86              | 1      | 84             | 2      | 67                                       | 3      |  |  |  |
| 2010-2011   | 89                                   | 1      |                              |        | 67              | 3      | 71             | 3      | 70                                       | 3      |  |  |  |
| 2011-2012   | n. a.                                | n. a.  | n. a.                        | n. a.  | n. a.           | n. a.  | n. a.          | n. a.  | n. a.                                    | n. a.  |  |  |  |
| 2012-2013   | n. a.                                | n. a.  | n. a.                        | n. a.  | n. a.           | n. a.  | n. a.          | n. a.  | n. a.                                    | n. a.  |  |  |  |
| <b>Average periodic rating for each indicator</b> | ---                                  | 1.33   | ---                          | 1.00   | ----            | 1.66   | ---            | 2.00   | ---                                      | 3.00   |  |  |  |

<sup>6</sup> As mentioned earlier, the MRNF needs the performance evaluation results in the last-but-one year (2011-2012) of the five-year period to be evaluated (2008-2013). However, at that time it will probably not have the results for the last two years of the five-year period.

## Final evaluation of forest management and environmental performance

The final performance evaluation will be based on two fields, namely forest management and environment. We propose that a poor performance in one of these two fields should result in an “unsatisfactory” overall performance.

For each field, the MRNF will establish a threshold below which the forest management or environmental performance will be classified as unsatisfactory.

The RCPs and OFMs are usually sufficiently restrictive for agreement holders to improve their performance. However, the combined performance of the agreement holders in a given FMU may still be unsatisfactory despite the recurrent annual application of these two tools. Where this is the case, the MRNF intends to react by revising the volume of wood allocated in the five-year review of allocations mentioned in section 77 of the Forest Act, or by imposing a remedial program. It will apply the following principle when establishing the acceptability threshold: if, in the year following the RCP, several recurrent “2” or “3” ratings are obtained for activities in one of the two fields during the period under evaluation, the MRNF will judge the forest management and environmental performance as being unsatisfactory. Table 6 illustrates this policy; the proposed threshold is 1.3. Below this level, the MRNF may impose remedial programs.

Table 6: Proposed threshold for the final performance evaluation of all agreement and contract holders in a FMU (2008-2013)

| Periodic rating in each area<br>(2008-2013) | Forest management and<br>environmental performance |
|---|--|
| < 1.3                                       | Satisfactory                                       |
| ≥ 1.3                                       | Unsatisfactory                                     |

Under section 77 of the Forest Act, it is this latter rating that the MRNF will consider in 2011-2012 when reviewing the volumes of wood to be allocated for the five-year period 2013-2018. In addition to this quantitative method, we also believe the opinions of MRNF analysts are fundamental in reaching a final verdict.

### 3.1.4 Questions for consultation

The following questions concern specific aspects of the proposed evaluation approach. Your comments are requested:

1.0 Do you think the proposed evaluation approach, using RCP indicators, is appropriate?

1.1 Are there any other aspects that meet the indicator selection criteria but are not already covered by the proposed indicators, which you think should be covered in the performance evaluation?

1.2 Do you have any specific comments on the use of a rating system on a scale of 1 to 3 to evaluate the performance for each indicator?

2.0 Would you like to comment on the relative weighting of the indicators? Please indicate the relative weighting that you would propose for each indicator, and give reasons for your choice.

3.0 Would you like to comment on the fact that overall performance may be rated “unsatisfactory” in the case of either a poor forest management performance or a poor environmental performance?

4.0 Do you have any specific comments on the proposal to set the success threshold at 1.3 for the final evaluation?

5.0 Do you have any other comments on the proposed evaluation approach?

To facilitate our analysis, please ensure that the question number is referenced at the beginning of your answer.

## Appendix A – Section 77 of the Forest Act

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“77. The Minister may, every five years after approving or finalizing a general forest management plan and after giving the agreement holder an opportunity to present observations, revise the volume of timber allocated under any agreement concerning the management unit, withdraw the management unit from the agreement or add other management units to the agreement so as to reflect

- 1) changes in the requirements of the wood processing plant;
- 2) changes in the availability of timber from private forests or from outside Québec, changes in the availability of timber in the form of wood chips, sawdust, shavings or recycled wood fibres, and changes in the availability of volumes of timber allocated under forest management agreements or in the evaluation of the volumes that may be harvested by the holders of forest management contracts;
- 3) the average annual volume of timber, by origin, used by the plant since the beginning of the period covered by the preceding general management plans;
- 4) the annual allowable cuts assigned to the management unit in the new plan;
- 5) all the forest management activities carried out in the management unit since the beginning of the period covered by the preceding general plans, and especially the impact of those activities on the state of conservation of the forest and the forest environment and the effectiveness of the silvicultural treatments and the other protection and conservation measures applied;
- 6) a change or lack of improvement in the industrial performance of the agreement holder in the use of ligneous matter in the processing plant mentioned in the agreement since the beginning of the period covered by the preceding general plans.

Modifications to the agreements are applicable in respect of forest management activities carried out after the coming into force of the new general plans.

The Minister may reserve or allocate any volume of timber that becomes available pursuant to this section, as the Minister considers expedient.”

“77.1. No increase in volume may be allocated pursuant to section 77 if the Minister considers that the forest management activities carried out in the management unit are unsatisfactory, having regard to the elements mentioned in subparagraph 5 of the first paragraph of section 77.”

“77.3. Where the Minister decides, taking into account the elements mentioned in subparagraphs 5 and 6 of the first paragraph of section 77, to reduce the volume allocated under an agreement, the Minister may postpone the revision and require the agreement holder to submit for approval, within the time and on the conditions fixed by the Minister, a corrective program containing measures to ensure that the results determined by the Minister are attained.

The Minister may approve the program, reject it or approve it with amendments.

If the agreement holder fails to apply the program, the Minister shall terminate it, cancel the postponement and apply the reduction in volume.”

## Appendix B – Regional results of the forest management and environmental performance for the period 1999-2008 <sup>7</sup>

|   | Region 01 | Region 02 | Region 03 | Region 04 | Region 06 | Region 07 | Region 08 | Region 09 | Region 11 | Average for the common areas <sup>8</sup> |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---|
| Number of common areas  | 15        | 21        | 10        | 9         | 7         | 11        | 19        | 6         | 13        |   |
| Protection of species at risk (threatened or vulnerable)  | 10.0      |           | 10.0      |           | 10.0      | 10.0      |           | 10.0      | .         | 10.0                                      |
| Protection of exceptional forest ecosystems   | 6.7       |           | 6.7       |           | 7.5       | 10.0      | 10.0      | 10.0      | 5.0       | 7.8                                       |
| Loss of productive areas associated with the road network   | 9.5       | 8.3       | 8.5       | 9.8       | 8.3       | 9.3       | 9.8       | 9.1       | 7.3       | 9.0                                       |
| Areas harvested using regeneration cutting and without rutting problems   | 9.5       | 8.2       | 8.7       | 8.5       | 8.9       | 8.8       | 7.0       | 8.3       | 10.0      | 8.6                                       |
| Compliance of forest management activities with the provisions of the Regulation respecting standards of forest management for forests in the domain of the State concerning the protection of water quality and fish habitats            | 8.0       | 8.1       | 8.2       | 6.9       | 7.4       | 7.7       | 8.5       | 6.0       | 8.4       | 8.0                                       |
| Compliance of forest management activities with the provisions of the Regulation respecting standards of forest management for forests in the domain of the State concerning the protection of wildlife habitats other than fish habitats | 9.6       |           | 9.9       |           | 9.7       | 10.0      | 10.0      | 10.0      | 9.3       | 9.7                                       |
| Compliance of forest management activities with the provisions of the Regulation respecting standards of forest management for forests in the domain of the State concerning compatibility with the public land use plan                  | 9.7       | 9.9       | 9.4       | 9.6       | 9.8       | 9.9       | 10.0      | 10.0      | 9.9       | 9.8                                       |
| Compliance of commercial silvicultural work (admissible as payment of dues) with the Department's acceptability standards   | 9.5       | 9.0       | 9.1       | 9.0       | 7.4       | 6.0       | 9.1       | 10.0      | 9.9       | 8.9                                       |
| Compliance of non-commercial silvicultural work (admissible as payment of dues) with the Department's acceptability standards   | 9.8       | 9.2       | 9.7       | 9.7       | 9.4       | 8.7       | 9.9       | 9.6       | 9.9       | 9.7                                       |

<sup>7</sup> The results for each indicator are out of 10 points.

<sup>8</sup> Provincial totals are mean averages calculated from the results for each common area

|   | Region 01 | Region 02 | Region 03 | Region 04 | Region 06 | Region 07 | Region 08 | Region 09 | Region 11 | Average for the common areas <sup>8</sup> |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---|
| Number of common areas  | 15        | 21        | 10        | 9         | 7         | 11        | 19        | 6         | 13        |   |
| Compliance with the <i>Forest Management Manual's</i> planting and cutting with protection of regeneration and soils requirements | 9.5       | 9.3       | 9.0       | 9.9       | 9.1       | 7.9       | 9.7       | 7.7       | 9.8       | 9.4                                       |
| Compliance of planting work and cutting with protection of regeneration and soils with <i>Forest Management Manual</i> standards  | 9.2       | 8.4       | 4.6       |           | 9.9       | 5.1       | 6.2       | 8.1       | 9.9       | 7.2                                       |
| Compliance with harvest volumes stipulated in the annual forest management agreement  | 7.7       | 7.3       | 8.2       | 7.6       | 8.1       | 6.6       | 6.8       | 9.4       | 6.9       | 7.4                                       |
| Overall rating (%)  | 90.9      | 85.7      | 83.8      | 88.8      | 86.3      | 79.1      | 84.6      | 87.2      | 82.2      | 86.9                                      |
| Average number of indicators per common area  | 8.9       | 7.1       | 9.5       | 7.7       | 8.7       | 7.9       | 8.2       | 5.4       | 7.5       | 7.9                                       |

## Appendix C – Description of Performance Indicators for the Environmental and Forest Management Areas

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The proposed indicators are either already in use or in the process of being developed by the MRNF for its RCPs. The method used to calculate the results is subject to change.

### Environmental Performance Indicators (E)

#### **E1 Rate of application of proposed measures (biological refuges, extended rotation patches and adapted silvicultural practices) to ensure permanent maintenance of mature and overmature forests**

To ensure that mature and overmature forests are permanently maintained in every FMU, the MRNF proposes the gradual introduction of biological refuges, extended rotation patches and adapted silvicultural practices.

A biological refuge is a small area of forest in which all forest management activities are permanently prohibited in order to preserve the biodiversity associated with old-growth forests. Biological refuges account for 2% of the productive forest area in a FMU. An extended rotation patch is an area of forest where most of the stands are allowed to age beyond the harvesting age (felling age) normally proposed for the region, so that they are able to reach the mature and overmature stage. Lastly, an adapted silvicultural practice is a silvicultural treatment that consists in harvesting some of the trees with a view to maintaining certain characteristics of mature and overmature trees, and to ensure that the forest reverts quickly to these development stages.

This indicator is composed of three sub-indicators (A, B and C) that are used to evaluate the level of protection granted to biological refuges and extended growth patches during forest management activities, and also the proper application of adapted silvicultural practices. It measures the achievement of one of the 11 PDOs that will form part of the next GFMPs (2008-2013). Performance will be assessed from the (weighted) result of the following calculations:  $(A \times 0.4) + (B \times 0.35) + (C \times 0.25)$ .

A: % of protected biological refuges =  $(a \div b) \times 100$

a: Number of existing biological refuges that were protected during forest management activities

b: Total number of existing biological refuges that are likely to be affected by forest management activities

B: % of protected extended rotation patches =  $(a \div b) \times 100$

a: Number of existing extended rotation patches that were protected during forest management activities

b: Number of existing extended rotation patches that are likely to be affected by forest management activities

C: % of proper application of adapted silvicultural practices =  $(a \div b) \times 100$

a: Treated area (ha) where adapted silvicultural practices were applied correctly

b: Treated area (ha) where adapted silvicultural practices were proposed in the plan

Biological refuges and extended rotation patches are considered likely to be affected by forest management activities when forestry work takes place less than 100 m from their perimeter.

## **E2 Rate of protection of areas to which conservation measures apply**

In many areas, conservation measures are applicable for a variety of reasons such as unusual composition and the area's importance as a habitat for certain species, or to maintain biodiversity. Such areas may be wholly protected, in which case no forestry work is permitted, or partially protected, in which case certain activities are permitted, but with special conditions. This indicator is used to assess the percentage of public land subject to conservation measures that was in fact protected during forest management activities. Performance will be assessed from the result of the following calculation:  $(a \div b) \times 100$ .

- a: Total number of areas protected during forest management activities
- b: Total number of areas likely to be affected by forest management activities

The criteria used to determine whether or not an area subject to protection was in fact disturbed during forest management activities vary according to the size of the area and its other characteristics. For example, more stringent criteria will be used to evaluate the impact of forest management activities on a one-hectare habitat of a threatened plant species than on a 10,000-hectare caribou protection area. Areas subject to conservation measures are considered likely to be affected by forest management activities when forestry work takes place less than 100 m from their perimeter.

The areas subject to conservation measures include:

- Exceptional forest ecosystems on public land under management;
- Protected areas (other than exceptional forest ecosystems);
- Small areas of threatened or vulnerable species' habitats – other than those considered to be protected areas – to which protective measures apply;
- Woodland caribou habitats;
- The wildlife habitats mentioned in the Regulation respecting standards of forest management for forests in the domain of the State.

### **Exceptional forest ecosystems on public land under management**

Integral protection of these areas is assessed by counting the number of known exceptional forest ecosystems located on public land under management that were protected during forest management activities.

An exceptional forest ecosystem is a forest or forest stand composed of a rare forest, an old-growth forest or a forest sheltering threatened or vulnerable species. Known exceptional forest ecosystems are classified under the Forest Act or have been proposed for exceptional forest ecosystem status and are provisionally protected by the MRNF under the terms of an administrative directive.

### **Protected areas (other than exceptional forest ecosystems)**

Integral protection of these areas is assessed by counting the number of protected areas located on public land under management that were in fact protected during forest management activities.

A protected area is an area that receives protection pursuant to the Natural Heritage Conservation Act and other acts allowing for the creation of protected areas. Protected areas include parks, biodiversity reserves, ecological reserves, aquatic reserves and the habitats of threatened or vulnerable species designated pursuant to the Act respecting threatened or vulnerable species. The habitats of designated threatened or vulnerable species are as shown in a plan drawn up by the government departments in question, in compliance with the Act respecting threatened or vulnerable species.

### **Small areas of threatened or vulnerable species' habitats – other than those considered to be protected areas – to which protective measures apply**

Partial or total protection of these areas is assessed by counting the number of known sites sheltering threatened or vulnerable species covered by small area protective measures and located in the forest under management that were effectively protected during forest management activities. This part of the indicator also measures the achievement of one of the 11 PDOs that will form part of the next GFMPs (2008-2013).

A known site is a site whose location was submitted to agreement holders before they planned their forest management activities. A threatened or vulnerable species is a wildlife or plant species that is, or is likely to be, protected by the Act respecting threatened or vulnerable species and whose name appears on a list determined by ministerial order.

### **Woodland caribou habitats**

Protection of these areas is assessed by counting the number of protection blocks or sites of interest to caribou that are located in the forest under management and were protected during forest management activities. This part of the indicator measures the achievement of one of the 11 PDOs that will form part of the next GFMPs (2008-2013).

A protection block is a single block forest area in which all forest operations are temporarily prohibited in order to protect woodland caribou habitat. Each block comprises representative portions (e.g. age, composition) of the type of environment that meets the needs of the woodland caribou in the short and medium term, mostly in winter. The minimum size of a protection block is 100 km<sup>2</sup>, but ideally it should be 250 km<sup>2</sup>. Conservation of protection blocks is covered by special management plans for woodland caribou habitats.

### **Wildlife habitats mentioned in the Regulation respecting standards of forest management for forests in the domain of the State**

The Regulation respecting standards of forest management for forests in the domain of the State contains a number of measures aimed at protecting certain wildlife habitats (other than fish habitats) in the public forests. They include buffer strips, periods of the year in which forest operations must cease, and the maintenance of certain stand structures or compositions during authorized forestry work.

Protection is assessed by determining whether or not the forest management activities were in compliance with regulatory provisions concerning the protection of wildlife habitats other than fish habitats. To do this, the MRNF identifies the number of habitats where the provisions were applied correctly.

The wildlife habitats mentioned in the Regulation respecting standards of forest management for forests in the domain of the State are as follows: waterfowl gathering areas, white-tailed deer yards, areas frequented by caribou south of the 52<sup>nd</sup> parallel, cliffs inhabited by colonies of birds, muskrat habitats, heronries, islands or peninsulas inhabited by colonies of birds, bear dens and salt licks frequented by moose.

### **E3 Rate of application of proposed measures to preserve preserving deadwood in forests under management**

This indicator comprises three sub-indicators (A, B and C) used to assess the application of measures aimed at preserving deadwood in the forests under management in a FMU. It also measures the achievement of one of the PDOs that will form part of the next GFMPs (2008-2013). Performance will be assessed from the (weighted) results of the following calculations:  $(A \times 0.33) + (B \times 0.33) + (C \times 0.33)$ .

A: % of protected riparian buffer strips (in which forest management is prohibited) =  $(a \div b) \times 100$

a: Number of segments of riparian buffer strips that were protected during forest management activities

b: Number of segments of riparian buffer strips likely to be affected by forest management activities

Riparian buffer strips are considered likely to be affected by forest management activities when forestry work takes place less than 100 m from their perimeter.

B: % of the area in which cutting with protection of regeneration and soils was performed correctly, leaving clusters of trees intact =  $(a \div b) \times 100$

a: Treated area (ha) in which cutting with protection of regeneration and soils was performed correctly, leaving clusters of trees intact

b: Treated area (ha) for which cutting with protection of regeneration and soils, leaving clusters of trees intact, was planned

C: % of the area (ha) treated with selection cutting<sup>9</sup> in which large dying trees have been preserved =  $(a \div b) \times 100$

a: Area (ha) treated with selection cutting where at least 1 m<sup>2</sup>/ha of large class M dying trees have been preserved

b: Total treated area (ha) for which selection cutting was planned

The measures proposed to preserve dead wood in forests under management are:

- To permanently prohibit all types of forestry work in 20% of the total area of riparian buffer strips;
- To carry out cutting with protection of regeneration and soils leaving clusters of trees intact on at least 5% of the area subjected to cutting with protection of regeneration and soils;
- To leave at least 1 m<sup>2</sup>/ha of large dying trees untouched in selection cutting areas;
- To leave standing all snags and non-commercial living trees (unallocated volume), provided they do not compromise management objectives or worker safety. This measure is not used to evaluate performance, because it is difficult to determine whether the risk to workers may have influenced the number of snags to be protected.

A riparian buffer strip is a 20 m strip of trees that is wholly or partially preserved during logging of the banks of peat bogs with ponds, swamps, marshes, lakes or permanently flowing watercourses, measured from the boundary of the adjacent forest to the riparian ecotone (transition area between the aquatic

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9. If selection cutting has not been carried out in the FMU, only the first two elements will be evaluated (equal relative weighting).

environment and the forest). Cutting with protection of regeneration and soils leaving clusters of trees intact is defined as cutting with protection of regeneration and soils during which clusters of trees are left standing in order to provide a more constant presence of deadwood throughout the stand recovery period. The purpose of this is to ensure that approximately 5% of the logged area is left standing in clusters of between 150 m<sup>2</sup> and 200 m<sup>2</sup>, in which no trees may be cut. A dying tree is a tree in vigour class M (for mortality) of the MRNF's MSCR (French acronym for mortality, survival, growing and reserved) tree classification system. Class M trees are highly defective trees that are likely to fall, break or die standing before the next harvest. This type of tree often has features such as cavities and dead branches that are useful to various plant and wildlife species.

#### **E4 Average number of cases of erosion observed on the road network, by bridge or culvert**

Most cases of erosion along the road network occur where roads and watercourses intersect. This indicator evaluates the average number of cases of erosion – observed along the annual road network – by bridge or culvert. It measures the achievement of one of the 11 PDOs that will form part of the next GFMPs (2008-2013). Performance will be assessed from the result of the following calculation: (a ÷ b).

- a: Total number of cases of erosion observed along the road network
- b: Total number of bridges and culverts located along the road network

A case of erosion is a displacement of soil due to the erosive action of water, with sediment deposited repeatedly into the water network, possibly in small quantities. Any significant degradation of road infrastructures that prevents access to a given area is also considered to be a case of erosion. The annual road network is the network of roads located within sectors that are logged during a given year.

#### **E5 Rate of compliance of forest management activities with aquatic environment protection standards**

Every year, the MRNF performs a verification that includes an assessment of the extent to which forest management activities comply with the provisions of the Regulation respecting standards of forest management for forests in the domain of the State and the Forest Act concerning protection of the aquatic environment. These legislative and regulatory provisions relate among other things to road construction and the protection of riparian buffer strips. The results of the monitoring process are used to measure this indicator. Calculation elements for this indicator will be decided at a later date, since the monitoring and control process is currently under review.

## Forest Management Performance Indicators (F)

### **F1 Rate of compliance of partial cuts (after treatment)**

Partial cuts include selection cutting, commercial thinning, alternative silvicultural treatments and initial seed cutting.

Areas under management that meet the criteria set out in the *Instructions concerning the application of the Regulation respecting the value of silvicultural treatments admitted as payment of dues* are accepted by the MRNF in lieu of payment of dues. The MRNF verifies certain areas and establishes the rate of compliance from the results of its verifications. Partially credited work is deemed non-compliant.

The rate of compliance of partial cuts after treatment is established as follows, for the FMU as a whole:

$(a \div b) \times 100 = \% \text{ of compliance of partial cuts (after treatment)}$

a: Areas verified and found to be compliant

b: Total areas verified during the period

### **F2 Rate of compliance of targeted non-commercial silvicultural treatments (after treatment)**

Targeted non-commercial silvicultural treatments include pre-commercial thinning, release cutting, land preparation, planting and fill planting.

Areas under management that meet the criteria set out in the *Instructions concerning the application of the Regulation respecting the value of silvicultural treatments admitted as payment of dues* are accepted by the MRNF in lieu of payment of dues. The MRNF verifies certain areas and establishes the rate of compliance from the results of its verifications. Partially credited work is deemed non-compliant.

The rate of compliance of targeted non-commercial silvicultural work after treatment is established as follows:

$(a \div b) \times 100 = \% \text{ of compliance of targeted non-commercial silvicultural work (after treatment)}$

a: Areas verified and found to be compliant

b: Total areas verified during the period

### **F3 Weighted score for *Forest Management Manual* monitoring**

The weighted score for *Forest Management Manual* monitoring relates to all monitoring required by the *Manual* plus all silvicultural treatments (cutting with protection of regeneration and soils, regeneration cutting, planting and fill planting, selection cutting by parquets and selection cutting for single trees and groups of trees) that require monitoring of forestry work carried out in previous years.

The purpose of the monitoring is to answer three questions:

- Have all areas treated in previous years been monitored?

- Are the data provided by agreement and contract holders reliable?
- Have *Manual* yields been achieved?

For each question, performance will be assessed using three sub-indicators (A, B and C), as follows:

A:  $(a \div b) \times 100 = \% \text{ of monitoring carried out}$

- a: Area monitored
- b: Area to be monitored

The monitoring schedule will be established in the spirit of the *Forest Management Manual* (4<sup>th</sup> Edition, 2003 Version) in accordance with the agreement with the MRNF (area carried forward) and in accordance with the remedial work stipulated in the remedial plan.

This result will count for 25% of the final indicator rating.

B:  $(a \div b) \times 100 = \% \text{ of monitoring data compliance}$

- a: Verified area for which data have been accepted
- b: Total verified area

This result will count for 25% of the final indicator rating.

C: If the monitoring data provided by the agreement or contract holder are reliable (rated 1), the extent to which the yield stipulated in the *Forest Management Manual* has been achieved will be assessed using the following formula:

$(a \div b) \times 100 = \% \text{ of achievement of yields stipulated in the } \textit{Forest Management Manual}$

- a: Verified area in compliance and accepted unverified area
- b: Total area minus non-compliant, non-correctable area<sup>10</sup>

If the monitoring data provided by the agreement or contract holder are not reliable (rated 2 or 3), the extent to which the yield stipulated in the *Forest Management Manual* has been achieved will be assessed using the following formula, which takes into account only the areas that were verified:

$(a \div b) \times 100 = \% \text{ of achievement of performance stipulated in the } \textit{Forest Management Manual}$

- a: Verified area in compliance
- b: Total verified area

The result obtained for the third sub-indicator will count for 50% of the final rating, giving it a relative weighting equal to that of the first two sub-indicators combined.

The final rating for *Forest Management Manual* monitoring will be obtained by adding the three weighted ratings together.

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10. The notion of non-compliant, non-correctable area will be defined with examples, so as to include only those area for which the criteria have not been achieved, even if the agreement or contract holder has done everything that needed to be done.

#### **F4 Volume of residues for evaluation of volumes affected by logging operations**

Residues are volumes of wood left on logging sites (regeneration cutting and partial cutting) and in piling, lopping and sawing areas (associated with a logging sector), as well as pockets of standing timber that should have been logged. Residues are measured using the *Estimates of timber volumes affected by logging operations – Instructions*. Measurements are taken at FMU level and are adjusted according to the volumes allocated.

The legislative framework stipulates the acceptability standards for volumes of wood left on logging sites. In the case of cutting with protection of regeneration and soils or strip cutting with protection of regeneration and soils, permit holders must salvage the volume of usable timber in a logging sector or in a piling, lopping or sawing area that exceeds an average of 3.5 cubic metres per hectare in the sector or area as a whole, in the year following the date on which the permit expires.

In the case of any other silvicultural treatment applied in a logging sector or in a piling, lopping or sawing area, the permit holder must salvage the volume of usable timber in excess of an average of 1.0 metres per hectare in each area or sector, in the year following the date on which the permit expires.

This indicator will measure the average volume per hectare of timber left on logging areas in excess of the norm ( $> 3.5$  or  $1 \text{ m}^3/\text{ha}$ , depending on the type of treatment), based on the following formula:

$$a \div b = \text{Average volume of residues per hectare (m}^3/\text{ha)}$$

a: Measured volume ( $\text{m}^3$ ) of residues adjusted to allocations

b: Size (ha) of logged areas

#### **F5 Rate of compliance of forest management with usage harmonization measures**

This indicator is used to assess the percentage of agreed harmonization measures that were applied by agreement holders in their forest management activities. It covers one of the PDOs to be included in the 2008-2013 GFMPs.

The harmonization measures are taken from the PDO concerning harmonization of uses and the PDO concerning landscapes. Other harmonization measures may also be agreed upon and may be taken from other contexts. For example, they may have been established:

- In a previous GFMP or five-year forest management plan;
- As a result of participation by other forest users in the GFMP preparation process;
- During the public GFMP information and consultation procedure;
- During the GFMP validity period.

The rate of compliance with harmonization measures is assessed using the following three sub-indicators (A, B and C):

$$\text{A: \% of harmonization measures enforced, in ha} = (a \div b) \times 100$$

a: Total quantity of harmonization measures enforced, in ha

b: Total quantity of proposed harmonization measures, in ha

$$\text{B: \% of harmonization measures enforced, in km} = (a \div b) \times 100$$

a: Total quantity of harmonization measures enforced, in km

b: Total quantity of proposed harmonization measures, in km

C: % of harmonization measures enforced, in numbers =  $(a \div b) \times 100$

a: Total quantity of harmonization measures enforced, in numbers

b: Total quantity of proposed harmonization measures, in numbers

Based on the results of these three sub-indicators, the management unit is able to assess whether the overall result is satisfactory or unsatisfactory. The method used to calculate the final rating for this indicator will be established at a later date, in the RCPs.

### **F6 Rate of compliance of forest management with usage harmonization measures associated with Aboriginal community relations**

This indicator is used to assess the percentage of measures to harmonize forest management with Aboriginal forest uses that were effectively applied by agreement holders in their forest management activities. It covers the forest resource PDO included in the 2008-2013 GFMPs relating to the maintenance or improvement of the habitats of wildlife species of importance to the Cree people, and to the measures required to allow the Aboriginal people to pursue their traditional activities.

The harmonization measures may be taken from different sources. For example, they may have been established:

- In a previous GFMP or five-year forest management plan;
- As a result of participation by other forest users in the GFMP preparation process;
- During the public GFMP information and consultation procedure;
- During ministerial consultations with Aboriginal communities on the GFMPs or on the revision of TSFMAAs and FMAs;
- During the GFMP validity period, or during ministerial consultations with Aboriginal communities on the annual forest management plans.

Rate of compliance with the agreed harmonization measures is assessed using the following three sub-indicators (A, B and C):

A: % of harmonization measures enforced, in ha =  $(a \div b) \times 100$

a: Total quantity of harmonization measures enforced, in ha

b: Total quantity of proposed harmonization measures, in ha

B: % of harmonization measures enforced, in km =  $(a \div b) \times 100$

a: Total quantity of harmonization measures enforced, in km

b: Total quantity of proposed harmonization measures, in km

C: % of harmonization measures enforced, in numbers =  $(a \div b) \times 100$

a: Total quantity of harmonization measures enforced, in numbers

b: Total quantity of proposed harmonization measures, in numbers

Based on the results of these three sub-indicators, the management unit is able to assess whether the overall result is satisfactory or unsatisfactory. The method used to calculate the final rating for this indicator will be established at a later date, in the RCPs.

## Appendix D – Description of Environmental Performance Indicators with Five-Year Targets, to be used for the Third Performance Evaluation in 2013-2018

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### **E6 Percentage of regeneration cutting sites disturbed by ruts**

The MRNF wishes to reduce rutting caused by the use of heavy machinery in areas under regeneration in the public forests. This indicator comprises two sub-indicators (A and B) that are used to assess the percentage of regenerating cutting sites with little or no rutting, and the percentage of sites with extensive rutting. The indicator measures the achievement of one of the 11 PDOs to be included in the next GFMPs (2008-2013). Each sub-indicator is measured by means of the following calculations:

A: % of cutting sites with little or no rutting =  $(a \div b) \times 100$

a: Area of cutting sites with little or no rutting (ha)

b: Total area of cutting sites harvested in the management unit (ha)

B: % of cutting sites with extensive rutting =  $(a \div b) \times 100$

a: Area of cutting sites with extensive rutting (ha)

b: Total area of cutting sites harvested in the management unit (ha)

Performance will be assessed from the sum of the differences between the target set for each sub-indicator and the result obtained. In the case of A, targets vary from 75% to 90% of cutting sites with little or no rutting in each FMU. In the case of B, the target is 0% of cutting sites with extensive rutting for all FMUs.

Therefore, the sum of the differences = (Target for A – Result for A) + (Result for B – Target for B).

For example, in the case of A, a result of 70% and a target of 75% of cutting sites with little or no rutting would give a difference of 5%. In the case of B, a result of 3% and a target of 0% would give a difference of 3%. Performance will be assessed from the sum of these differences – which is 8% in this particular case.

A cutting site is a portion of a single block area that is harvested in a given year and is delimited by forest strips (logging separators). A site has little or no rutting when the rutting rate is statistically below 20%, and has extensive rutting where the rutting rate is statistically above 20%. Regeneration cutting is defined as the harvesting of trees in order to trigger new regeneration or foster existing regeneration. Regeneration cutting includes cutting with protection of regeneration and soils and gradual seed cutting. The rutting rate is equal to the rutted percentage of the total length of logging and hauling trails.

### **E7 Loss of productive forest area associated with the road network**

This indicator is used to assess the percentage of logged forests in which productive areas have been lost following harvesting in even-aged and uneven-aged areas under management. It measures the achievement of one of the 11 PDOs that will form part of the next GFMPs (2008-2013). Performance will be assessed from the result of the following calculation:  $(a \div b) \times 100$ .

a: Loss of productive area (ha) = c + d

- b: Total area harvested each year (ha)
- c: Loss corresponding to the area (ha) occupied by sections of forest road located within the boundaries of the logging areas and used during the same year of operation = average width of roads (including ditches) x total length of road network.
- d: Loss corresponding to the area (ha) disturbed alongside roads. This loss is assessed differently in sectors under even-aged and uneven-aged management. In even-aged sectors, the loss of productive forest area is equal to the area that has become unproductive alongside roads as a result of activities that have disturbed the soil – e.g. exposure of rock, exposure of non-fertile soil horizons, formation of ponds or mud, and accumulation of timber debris. These disturbances are considered to be losses if they measure at least 5 m<sup>2</sup> and will prevent the production of commercial timber in the next stand revolution. In uneven-aged sectors, the loss of productive forest area is equal to the roadside areas deforested to allow machinery to circulate and to pile logs = average width of deforested areas (excluding width of road) x total length of road network.



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