



Protected areas
in Québec:

A Lifelong Heritage

Réserve de biodiversité de la Moraine- d'Harricana



CONSERVATION PLAN

Québec 

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Introduction

In 2004, the Gouvernement du Québec moved to protect two territories, one in the area of Réservoir Decelles, the other in the vicinity of Lac Lemoine.

The legal and provisional status of proposed biodiversity reserve was officially granted to both territories in July 2004 under section 27 of the *Natural Heritage Conservation Act* (chapter C-61.01). The proposed biodiversity reserves were given the temporary names of Réserve de biodiversité projetée de la forêt Piché-Lemoine and Réserve de biodiversité projetée du Réservoir Decelles.

On February 22, 2007 the Minister of Sustainable Development, Environment and Parks (MDDEP) mandated the Bureau d'audiences publiques sur l'environnement (BAPE) to hold a public consultation on the proposed protected areas of Lac Opasatica, Lac des Quinze, Forêt Piché-Lemoine and Réservoir Decelles. This mandate was given to the BAPE in accordance with section 39 of the *Natural Heritage Conservation Act*, which provides for a public consultation process before permanent protection status is recommended to the Gouvernement du Québec for a territory reserved for the creation of a new protected area. The BAPE's mandate began on March 8, 2007 and concluded on August 8 of the same year. The consultation was held in April and May 2007 in Val-d'Or, Rouyn-Noranda, Angliers, Lac-Simon and Winneway. The BAPE's inquiry and public hearing report (No. 244) was submitted to the Minister of the MDDEP on August 8, 2007 (BAPE, 2007). In its report, the commission recommended giving permanent protection status to the proposed biodiversity reserves of Forêt Piché-Lemoine and Réservoir Decelles.

Réserve de biodiversité de la Moraine-d'Harricana is the result of combining the two proposed biodiversity reserves. By giving permanent protected status to Réserve de biodiversité de la Moraine-d'Harricana, the Gouvernement du Québec ensures the definitive protection of representative samples of the biological diversity of the Abitibi lowlands natural province. More specifically, it protects representative ecosystems of two natural regions, the Lac Témiscamingue lowlands and the Abitibi plain. More precisely still, the reserve protects the ecosystems of three physiographic complexes: the Réservoir Decelles mounds, the Lac Parent plain and the Lac Preissac plain (MDDELCC, 2014a). Protection is thus accorded to a variety of ecosystems within a single biodiversity reserve. Additionally, the reserve consolidates the protection of Réserve écologique des Dunes-de-la-Moraine-d'Harricana, and joins a network of representative and exceptional protected areas that protects the various types of ecosystems across Québec.

The new biodiversity reserve combines the protection objectives of both proposed reserves, namely the protection of a complex of dunes and ombrotrophic bogs, a complex of low mounds, a recreational forest accessible to the public, and a significant portion of the Harricana moraine. The area protected with this last has been expanded with the fusion of the two proposed reserves, the extensions serving to protect more of the moraine and its associated environments. Réserve de biodiversité de la Moraine-d'Harricana thus protects a variety of noteworthy forests, including old yellow birch-balsam fir stands at the northern limit of their range, which could be considered exceptional forest ecosystems of the rare forest type.

1. The territory of Réserve de biodiversité de la Moraine-d'Harricana

1.1 Official toponym

Réserve de biodiversité de la Moraine-d'Harricana: the name refers to the presence of Harricana moraine, which is named after Rivière Harricana. The name "*Harricana*", spelled "*Harricanaw*", was first given in 1910 to the village along the river, which today is the city of Amos. Of Algonquin origin, the name means "*biscuit river*", where the term biscuit refers to a sort of hard bread that could be kept a long time and was highly appreciated by nomadic bands and voyageurs. According to the Commission de toponymie du Québec (1996), the Algonquins also use the name "*Inikana*", which is translated as "*river route*". Other spellings with implications for the meaning of name are also noted by the Commission de toponymie: "*anâkona*" (Algonquin), "*uhnahkoonah*" (Ojibway) and "*ayukoona'w*" (Cree).

1.2 Geographical location, boundaries and dimensions

The location and boundaries of Réserve de biodiversité de la Moraine-d'Harricana are illustrated in Appendix 1.

Location: Réserve de biodiversité de la Moraine-d'Harricana is located in the Abitibi-Témiscamingue region, in the regional county municipality of La Vallée-de-l'Or. It includes parts of three municipalities: the city of Rouyn-Noranda, the city of Val-d'Or and the municipality of Rivière-Héva, and extends between 47°43'07" and 48°05'53" north latitude and between 77°52'30" and 78°31'22" west longitude. The reserve is less than 10 km west of downtown Val-d'Or, and about 20 km northeast of

Winneway, where the Long Point First Nation has settled. The biodiversity reserve can be accessed either from highway 117 or via the Rapide-Sept or Baie-Carrière roads. It is served by an extensive network of forest roads that enter the territory from the north, south and central parts of the reserve.

The reserve is also about 40 kilometres west of Lac-Simon, and 60 kilometres northwest of Kitcisakik (MDDEP, 2007).

Area and boundaries: The initial area of the proposed reserves, when they were set aside in 2004, was 81 km² and 94 km². Following the public hearings, different expansion proposals were presented to the MELCC. In its analysis report (No. 244), the BAPE recommended evaluating the possibility of expanding the proposed reserves to include the areas of interest suggested, before granting permanent protection status (BAPE, 2007).

The area of Réserve de biodiversité de la Moraine-d'Harricana is 365 km², encompassing the merged territory of the proposed reserves of Forêt Piché-Lemoine and Réservoir Decelles. The final boundaries were defined on the basis of natural or anthropic elements that are easily identified on the ground, such as watercourses, lakes, forest roads and the edges of bogs. For sections along the banks of watercourses and water bodies, the real boundary is the natural high-water mark. For the section along the shores of the Decelles reservoir, the boundary corresponds to the of 311 metres.

The northern part of the reserve is crossed in an east-west direction by a 120 kV electrical transmission line, circuit 1339 Rapides des îles / Rapides-7. The transmission line and its right of

way (averaging about 37 metres in width) are excluded from the reserve. The excluded land corresponds to an easement granted to Société Hydro-Québec, as recorded in the Registre du domaine de l'État. Additionally, in its central part the boundary of the reserve follows that of a Hydro-Québec property surrounding the Rapide-7 dam, and circles around Réserve écologique des Dunes-de-la-Moraine-d'Harricana.

The legal boundaries of Réserve de biodiversité de la Moraine-d'Harricana are defined in the technical description and the survey map prepared by land surveyor Pierre Hains with the following minutes 11503 (February 8, 2018) and filed in the surveying archives of the Surveyor General of Québec (Greffé de l'arpenteur général du Québec), Ministère de l'Énergie et des Ressources naturelles, under document number 536700.

1.3 Ecological portrait

Réserve de biodiversité de la Moraine-d'Harricana is part of the Abitibi lowlands natural province. It protects representative ecosystems in the Lac Témiscamingue lowlands and Abitibi plain natural regions, and in particular protects representative natural environments in the physiographic complexes of the Lac Preissac plain, Lac Parent plain and Réservoir Decelles mounds. These environments are characterized by the elements described below, of which those of the greatest ecological interest are mapped in Appendix 2 (MDDELCC, 2014a).

1.3.1 Representative elements

Geology: The biodiversity reserve is in Superior geological province, where the foundation rock is Archean (over 2.5 billion years old). The

substratum is primarily intrusive igneous rock, i.e. granites. The eastern part of the reserve is underlain by metasedimentary rock in the form of paragneiss, with striations caused by intrusions of ultramafic volcanic rocks.

Geomorphology: When the Laurentide ice sheet melted, around 8500 years ago, it covered the bedrock with a thick layer of poorly drained glaciolacustrine sediments (silt and clay). Erosion by the waves of glacial lake Barlow-Ojibway stripped the silt from the tops of the highest mounds (Veillette, 2000).

Today the landscape is a plain punctuated with mounds and residual hillocks, gently sloping to the north.

In the portion of this glaciolacustrine plain that is within the reserve, the relief is less flat, with mounds and hillocks of till modulating the composition of ecosystems. The presence of the Harricana moraine adds yet another dimension to the area. The process by which it was formed left behind more diversified materials (morainic till), leading to the presence of sand dunes and complexes of dunes and bogs. The result is a heterogeneous relief with the elevation ranging from 293 to 430 metres (average 325 metres).

Besides the imposing moraine, there are several eskers to the north of Lac Lemoine, all with a north-south orientation.

The landforms and surface deposits of the biodiversity reserve reveal a considerable variety of natural environments. These can be grouped into five ecological units, as follows.

With its complex of mounds, low hills of till, and rocky outcrops, the most western unit is

representative of the physiographic complex of the Réservoir Decelles mounds.

The second unit is the Harricana moraine. It takes the form of a long ridge running in a northeast-southwest direction. This ecological unit has a varied landscape, with a dune plateau southeast of the moraine, a complex of dunes and bogs even further southeast, and sandy glaciolacustrine deposits at the bottom of slopes.

Southeast of the moraine, the third ecological unit is a glaciolacustrine plain of clay and silt, out of which arise numerous mounds of till.

North of Lac Lemoine, the biodiversity reserve includes a broad glaciolacustrine plain of silty clay. Occasional hillocks and knolls of till are scattered among the numerous hollows, which are filled with organic deposits and (in wet areas) bogs and swamps.

Lastly, due to its large area and highly developed shoreline in places, Lac Lemoine constitutes an ecological unit in itself.

Hydrography: The biodiversity reserve straddles the line separating two major watersheds, that of Rivière des Outaouais (southwestern part) and that of Rivière Harricana (northeastern part), where Lac Lemoine is one of the river's headwater lakes.

The reserve contains a total of 225 lakes, thirteen of which have names. With an area of 23 km², Lac Lemoine is the largest. It is about 30 km long, with a maximum width of 2.6 km and a depth of up to 52 metres. Other lakes in the reserve are equally worthy of note, including Lac Godard, with an area of 2 km², and several smaller bodies of water, such as lakes Strong, Beaubassin, Randall, Riley, Kâmanatak, Dar, Bouleau,

Desroberts and Dominique, each having an area of 0.1 km² to 0.4 km². The total area of the water bodies and watercourses in the reserve is about 30 km², or 8% of the territory.

Climate: Most of the territory of Réserve de biodiversité de la Moraine-d'Harricana is subject to a mild continental subarctic climate, subhumid with a long growing season. Average temperatures range from 1.9°C to 4.5°C. The average annual precipitation ranges from 800 mm to 1359 mm, while the average growing season is from 180 to 209 days. However, some of the more northern parts of the reserve can experience a subhumid subarctic climate with a medium growing season. In these areas, temperatures are somewhat lower (from -1.5°C to 1.9°C) and the growing season is reduced to 150-179 days.

Reflecting this climatic situation, Réserve de biodiversité de la Moraine-d'Harricana includes two bioclimatic domains. Most of it is in the balsam fir-white birch domain, while the western extremity is in the balsam fir-yellow birch domain.

The balsam fir-yellow birch bioclimatic domain extends in a band from western to central Québec, between 47° and 48° north latitude. Mesic sites are occupied by mixed stands of yellow birch and conifers, including balsam fir, white spruce and eastern white cedar. Sugar maples are at the northern limit of their range here. Forest fires and epidemics of spruce budworm are the two main factors of forest dynamics. The abundance of yellow birch and pines diminishes from west to east, resulting in two subdomains. The reserve is in the western one, where yellow birch-balsam fir stands are omnipresent on mesic sites.

The balsam fir-white birch bioclimatic domain is dominated by stands of fir and white spruce. Both are mixed with white birch on mesic sites. On less favourable sites, black spruce, jack pine and tamarack are often accompanied by white birch or trembling aspen. Yellow birch and red maple only grow in the southern part of this bioclimatic domain, and that is the case in the reserve. Spruce budworm is the major factor of forest dynamics, since balsam fir is abundant. Nevertheless, forest fires also play an important role. The fire cycle is shorter in the western bioclimatic subdomain, where the reserve is located, which explains the abundance of hardwood stands and mixed stands of shade-intolerant species (trembling aspen, white birch and jack pine).

Forests: Forest occupies about 255 km² of the reserve, representing some 70% of the total or 76% of the land area. The difference is due to the abundance of wetlands, which occupy about 30% of the reserve's land area and for the most part have no forest cover. The latter consists of 12% deciduous forests, 35% mixed forests and 54% conifer forests.

Depending on the topography and surface deposits, the vegetation can vary, but is primarily composed of various sorts of balsam fir stands (accompanied variously by white birch, black spruce, black spruce and peat moss, or red maple) and black spruce stands (accompanied by peat moss or by mosses and heaths). However, the low hills and mounds in the westernmost part have environments favourable to the development of yellow birch-balsam fir stands.

Due to the extensive logging carried on in the past, the actual vegetation present is somewhat different. Fir stands are nearly absent, but black spruce stands are very common. The most

recently logged areas are occupied by shade-intolerant deciduous trees (white birch and trembling aspen). Areas of very sandy soil are often forested with jack pine. Some of the mounds or low hills have stands of yellow birch and red maple. These habitats are the only ones with mature forests, since they were passed over by the loggers.

The territory of Réserve de biodiversité de la Moraine-d'Harricana is characterized by woodlands of medium age (40-80 years), young stands (0-40 years) and by ever older forests (110 years and up), depending on when the last logging was done.

Despite the great heterogeneity of the reserve's geomorphology, the forest cover (both potential and real) is somewhat more homogeneous. However, given the variety of physical environments present, there should be greater diversity in the shrubby and herbaceous species, as well as in the wildlife.

Flora: No comprehensive plant inventory has been done on the territory of Réserve de biodiversité de la Moraine-d'Harricana. However, Baldwin (1958) and Rousseau (1974) studied the vascular flora of the clay belt of northeastern Ontario and northwestern Québec, where the reserve is located. Principally characterized by boreal vegetation, the clay belt covers most of Abitibi and northern Témiscamingue. The few inventories done after Baldwin's study indicate that the region is home to about 1000 vascular species, 125 species of lichen, 30 species of liverwort, and 159 species of moss. However, no inventory has been done of the region's mushrooms and algae.

Fauna: No inventory has been done of wildlife in the reserve. However, species mentioned in the literature as being characteristic of balsam fir-yellow birch and balsam fir-white birch forests include the following: snowshoe hare, black bear, red squirrel, Canadian beaver, muskrat, American porcupine, red fox, patched fox, American marten, weasel, fisher, American mink, coyote, wolf, river otter, Canadian lynx, moose, white-tailed deer, and seven species of bat, three of which are endangered. According to the literature, some fifty species of mammal could inhabit central Abitibi-Témiscamingue, and thus the territory of the reserve (MDDEP, 2007).

Bird surveys conducted by the Société du loisir ornithologique de l'Abitibi on the territory of the proposed biodiversity reserves of Forêt Piché-Lemoine and Réservoir Decelles revealed the presence of 131 species in Réserve de biodiversité projetée de la forêt Piché-Lemoine, most of them nesting and/or migratory, and 47 species (most also nesting and/or migratory) in Réserve de biodiversité projetée du Réservoir Decelles (Imbeau, 2004a and 2004b).

No fish survey has been done on the territory of the reserve. However, the species most prized for sport fishing are walleye, northern pike, smallmouth bass, brook trout and sauger (MDDEP, 2007). Also, according to old surveys from the 1970s on fish species in Rivière Piché and Lac Lemoine, conducted by the Ministère du Tourisme, de la Chasse et de la Pêche, the following fish were often caught: goldeye, brown bullhead, whitefish, northern pike, white sucker, golden shiner, emerald shiner, spottail shiner, burbot, trout-perch, logperch, yellow perch, walleye, sauger and slimy sculpin (MRNF, 2007).

It should also be noted that there is a walleye spawning bed in Ruisseau Desmarais, which feeds into Lac Lemoine, and another spawning bed in Rivière Piché (MRNF, 2007).

Among the herpetofauna (which include snakes, turtles, amphibians and salamanders), 22 species have been observed in Abitibi-Témiscamingue. Some could inhabit the lakes and watercourses of Réserve de biodiversité de la Moraine-d'Harricana (MRNF, 2007).

1.3.2 Outstanding elements

According to the Centre de données sur le patrimoine naturel du Québec (2014), no plant species that is threatened or vulnerable or likely to be so designated has been observed in the reserve. However, two colonies of Blind's bryum, a moss likely to be designated threatened or vulnerable, have been found on the northwestern periphery of the reserve.

Again according to the CDPNQ (2014), the southern bog lemming, which is also likely to be designated threatened or vulnerable, frequents the southwestern portion of the reserve. One occurrence of wood turtle, a vulnerable species, has been found northeast of the reserve, while the bald eagle, also a vulnerable species, nests at several places just outside the reserve. These species could frequent the reserve to feed or reproduce.

Woodland caribou, another vulnerable species, have also been observed in the section of the reserve that was Réserve de biodiversité projetée du Réservoir Decelles. This population appears to be in difficulty due to changes to its habitat, predation and hunting. Protection of the forest massif of Réservoir Decelles could help protect this species (MDDEP, 2008a).

The large number of bird species that frequent the territory of the reserve at some point in their life cycle should also be noted.

In the central part of the reserve there are four biological refuges listed in the *Registre des aires protégées du Québec*. Additionally, there are several legally protected areas near or just outside the reserve. They include a muskrat habitat and three biological refuges to the west of the reserve, another three just south of it, *Réserve écologique des Dunes-de-la-Moraine-d'Harricana* (adjacent to the central part of the biodiversity reserve), and another biological refuge to the west of the central part. Also worth noting is that in the portion south of Lac Lemoine, the reserve surrounds an experimental forest.

As mentioned previously, Ruisseau Desmarais, one of the southern tributaries of Lac Lemoine and Rivière Piché, is home to two walleye spawning grounds.

As for forests, there are mature stands of yellow birch-balsam fir at the northeastern end of the reserve, near the mouth of Lac Lemoine and Rivière Piché. At the northern limit of their range, they have been assessed and found to have the characteristics of exceptional (indeed rare) forest ecosystems. However, the *Ministère des Forêts, de la Faune et des Parcs* has not yet accorded them exceptional forest ecosystem status.

With regard to landforms, the portion of the moraine between Lac Lemoine and the Rapide-7 dam features numerous kettles and kettle lakes. Some of the moraine's kettles are outside the boundaries of the reserve. The diversity found in the approximately 100 km² of wetlands is also an element of undeniable ecological interest. These habitats could harbour a wealth of plant species.

The stable aeolian dunes are also of great ecological interest. This geomorphological phenomenon is rare in the Abitibi lowlands natural province, but covers 28 km² of the biodiversity reserve. It could be home to interesting or even rare plant species. Also worth noting is that the eskers and certain parts of the moraine contain groundwater of excellent quality.

It should be noted that the MRC de La Vallée-de-l'Or contains numerous archeological sites revealing the history of the Algonquin occupation of the territory. Some sites even suggest an Amerindian presence during the "archaic" prehistorical cultural period, from 5000 to 1000 years B.C. (MRC de La Vallée-de-l'Or, 2005). The presence of such sites in *Réserve de biodiversité de la Moraine-d'Harricana* remains to be confirmed. The archeological potential of the area could be significant, since the reserve is at the head of the Rivière Harricana and could have been part of an ancient corridor for Aboriginal migrations. Archeological digs should be done to confirm the presence of such sites, since there are three just northeast of the reserve near Val-d'Or.

1.4 Land occupation and uses

The principal occupations and uses exercised in *Réserve de biodiversité de la Moraine-d'Harricana* are shown in Appendix 3.

The biodiversity reserve is in part located on Category III lands, under the James Bay and Northern Québec Agreement (JBNQA), signed in 1975, and under the *Act Respecting the Land Regime in the James Bay and New Québec Territories* (chapter R-13.1) adopted in 1978. The reserve is also part of the territory covered by the hunting, fishing and trapping regime applicable

under chapter 24 of the JBNQA (*Act Respecting Hunting and Fishing Rights in the James Bay and New Québec Territories*, chapter D-13.1).

There are 95 registered land rights on the territory of the reserve, including 20 resort leases and 75 leases for temporary shelters (hunting shelters). It should be kept in mind however that the boundaries of the reserve exclude certain developed areas. The shores of Lac Lemoine are particularly developed. Additionally, there are vacation areas on private lands that could perhaps be consolidated, and three privately held lots bordering Réservoir Decelles near the Rapide-7 dam. These properties belong to outfitters.

Apart from the northeastern and western extremities, which overlie fur-bearing animal management units 03-B and 04, the biodiversity reserve primarily overlies the Grand Lac Victoria beaver reserve (fur-bearing animal management unit 07), where the Algonquin communities have particular hunting and fur-bearing animal trapping rights. The MFFP has no data on wildlife harvesting by these communities. The biodiversity reserve also overlies four trapping grounds. In the trapping seasons from 2009-2010 to 2014-2015, trappers harvested the following species: beaver, otter, Canadian lynx, fisher, American marten, striped skunk, American mink, weasels (all species), muskrat, red fox, raccoon and squirrel. According to the MRNF (2006a), although a few Algonquin communities live near and use the biodiversity reserve (at Lac-Simon, Kitcisakik and Long Point), no data was available on their subsistence wildlife harvesting or traditional activities. However, the MRNF (2006b) indicates that Aboriginal harvesting seems to be no higher than elsewhere in the Abitibi region. Outside of the Grand Lac Victoria beaver reserve,

the territory of the reserve overlaps four trapping grounds. A single trapping camp has been built on the protected territory, on Pointe à Boisvert in Lac Lemoine.

The entire territory of the reserve is in hunting zone 13, where sport hunting is practised. Data on the annual harvest of large game only concerns moose and black bear. The MRNF has examined hunting pressure on the territory of the reserve between 2011 and 2014. Over this period, 62 moose and 76 black bears were killed in the reserve. This gives an annual average of 16 moose and 19 black bears, or 0.43 moose and 0.53 black bear per 10km² per year. Compared to hunting zone 13 as a whole (0.5 moose and 0.19 black bears per 10 km²), the MRNF indicates that within the reserve, hunting pressure on moose was about average, while that on black bear was considerably higher than average (2015).

Réserve de biodiversité de la Moraine-d'Harricana is located in fishing zone 13 west, where the fishing of bass, pike, walleye, sturgeon, brook trout, lake trout and yellow perch is controlled (MDDEP, 2007). The MRNF has no data on sport fishing on the territory of the reserve (MRNF, 2006a, 2006b). Since 2011, for most of the lakes in fishing zone 13 including Lac Lemoine, there has been a minimum catch size of 32 cm for walleye. However, as of spring 2016 the new management plan for walleye changes the limit to a range of 32-47 cm. This means that fishers may only keep walleye measuring 32 to 47 cm.

In 2008, testing for toxic substances in the flesh of predatory fish in Réservoir Decelles was conducted by a team from the MELCC. The results revealed that mercury levels were such that consumption of walleye and sauger should

be limited to no more than four meals per month (MDDELCC, 2014b). Furthermore, according to the Guide to eating Québec freshwater sport fish (MDDELCC, 2014b), monthly consumption should not exceed two meals for walleye, four meals for northern pike, and eight meals for goldeye and white sucker caught in Lac Lemoine.

Though the Aboriginal communities at Lac-Simon and Kitcisakik use the territory of the reserve for their traditional subsistence activities, in 2006 the MRNF had no data on their wildlife harvesting. However, it does not seem to be any higher in Réserve de biodiversité de la Moraine-d'Harricana than elsewhere in Abitibi (MRNF, 2006a, 2006b; MDDEP, 2007). These communities primarily hunt moose, black bear, small game, Canada goose, ducks and partridge. The main species of fish they catch are walleye, pike, brook trout, lake trout and sturgeon (MDDEP, 2007). It should also be noted that the Algonquin communities probably gather wild strawberries, blueberries, raspberries and various medicinal plants in the biodiversity reserve. Algonquin hunters also use birch bark to make horns for calling moose (MDDEP, 2007).

Lac Lemoine attracts a great many users, including cottagers, boaters, hunters, fishers and residents. The proximity of Val-d'Or has much to do with the intensity of recreational activity here. In summer, water quality is monitored by citizen partners in the MELCC's Volunteer Lake Monitoring Program. The results for conventional parameters (such as total trace phosphorus and chlorophyll α), from tests conducted in summer 2009, suggest that water quality in Lac Lemoine can be problematic. The data indicate that the lake is in a mesotrophic state, with high concentrations of total trace phosphorus and chlorophyll. In other words, Lac Lemoine is at an

intermediate stage of eutrophication. A thorough assessment of its trophic status is needed, and should include littoral components like aquatic plants, periphyton and sediments, as well as the impact of human occupation and the presence of septic tanks. To slow down the process of degradation and aging, the MELCC recommends that measures be taken to limit nutrient inputs from human activities. Such measures will be essential to preserve Lac Lemoine and the many ways in which it is used and enjoyed (MDDEP, 2010).

Also worth mentioning is the campground at the confluence of Rivière Thompson and Lac Lemoine, near the northeastern boundary of the reserve, and the Piché-Lemoine forest, inside the reserve, where recreational activities are practised.

In the northwestern part of the reserve there is a canoe-kayak route. Starting at Lac Clair, it passes through lakes Mourier and Lemoine, then through Rivière Thompson and Lac De Montigny, before continuing north beyond the reserve. As is often the case with canoe-kayak routes, temporary and unofficial backcountry camping sites could appear on the shores of these bodies of water.

Additionally, the reserve is crossed at various places by snowmobile trails, both marked and unmarked. Trails for four-wheeling, cross-country skiing, hiking and bicycling cross the northeastern part of the reserve.

In two places, Réserve de biodiversité de la Moraine-d'Harricana is split by hydroelectric facilities. The southwestern portion is split by the Rapide-7 plant (installed power 48 MW), whose dam has a reservoir of over 230 km² and a waterfall over 20 metres high. The western

section is crossed by a power transmission line whose right of way (36.6 metres wide) is excluded from the biodiversity reserve (MDDEP, 2007).

As for mining activities, there are mining claims at the northern boundary of the reserve, in particular at the northern extremity of the esker to the east of Lac Lemoine. All around the former Réserve de biodiversité projetée de la forêt Piché-Lemoine, new mining claims have been granted in the years since it was set aside (BAPE, 2007). There are also a few active claims near the edges of the former Réserve de biodiversité projetée du Réservoir Decelles. In addition, a tailings facility belonging to the GoldEx division of Agnico Eagle Mines Limited was built in 2007 between the aforementioned esker and the outlet of Lac Lemoine. It is used in emergencies and when it is impossible to use the company's main tailings facility (BAPE, 2007; MDDEP, 2007). According to the MDDEP (2007), there are no active sand or gravel extraction sites within the boundaries of the reserve.

The landscape of Réserve de biodiversité de la Moraine-d'Harricana is fragmented by cutblocks (logged sections) and numerous forest roads. Some areas however are less used and/or accessed, especially to the north of Lac Lemoine and in the area of dunes and bogs to the east of Réserve écologique des Dunes-de-la-Moraine-d'Harricana.

Upgrading may be done on the forest roads shown in Appendix 4.

2. Conservation and development of Réserve de biodiversité de la Moraine-d'Harricana

This section presents conservation and development guidelines, together with objectives specific to Réserve de biodiversité de la Moraine-d'Harricana.

2.1 Protection of biodiversity

To maintain the viability of ecological processes, management of the reserve should give priority to protecting the ecosystems present and the species that depend on them. This includes allowing ecosystems that have been disturbed by recent logging or any other disturbance, especially anthropic, to recover their dynamics and natural characteristics.

Aside from the resort areas on the shores of Lac Lemoine, which are excluded from the reserve, existing buildings are relatively dispersed across the territory. The same applies to places where recreational and wildlife activities are practised. These activities should be managed to have as little impact as possible and no long-term impact on biodiversity.

Specific objectives:

- ***Promote the resilience of disturbed forest ecosystems***

About 40% of the reserve's forested area bears the traces of past logging. The scars left on the land where logging was done, in the ten to fifteen years before the reserve was created, are visible on the ground and in satellite images. Other portions of the reserve were also logged, but more in the past. These areas are already repopulated with forest communities of medium age.

The disturbed forest ecosystems should thus be able to recover their natural characteristics. The absence of any form of logging will facilitate that resilience. These environments have good productivity and will be able to re-establish themselves over the next few decades, with no need for active management measures such as planting and restoration.

- ***Ensure the protection of rare forests***

The forest ecosystems on till mounds and hillocks, whether in the north, south or west, are on the whole the only ones that were left essentially undisturbed. These ecosystems are mostly composed of mature to old forests. Deciduous stands such as yellow birch-sugar maple and maple-yellow birch are of particular ecological interest. It is rare to find such preserved forest ecosystems at this latitude, where they are at the northern limit of their range. According to a characterization done by the exceptional forest ecosystem team of the Ministère des Forêts, de la Faune et des Parcs, some of the yellow birch stands northeast of Lac Lemoine have the characteristics of exceptional forest ecosystems of the rare forest type. Other mature and old forests of yellow birch and sugar maple that have not been characterized could have the same qualities. Any additional fragmentation of the forest cover must therefore be avoided, except for unobtrusive development (such as hiking trails) to facilitate enjoyment of these natural environments.

- ***Ensure the preservation of elements of geomorphological interest***

Particular attention should be given to the Harricana moraine, its kettles, dune ecosystems and the complex of dunes and bogs.

The eskers should also be protected from any form of development that could affect their groundwater.

Lastly, there is a great wealth and diversity of wetlands in the reserve. Any development in them should be avoided.

2.2 Knowledge acquisition and environmental monitoring

Knowledge acquisition, besides being crucial to the achievement of objectives specific to natural heritage protection, will make it possible to monitor the natural environment. The knowledge acquired could also be used in developing activities for nature discovery, education and public awareness. It will facilitate the analysis of development projects, and ensure that management partners have a common understanding of the issues.

Ecological knowledge, especially about the support capacity of natural environments, and about the impact of recreational and tourist activities on ecosystems, must also be developed. This will be done to properly assess the wealth of the reserve's resources, to obtain representative data, and to develop the tools needed for good management, to ensure that the biodiversity specific to the reserve is conserved.

Specific objectives:

- ***Increase knowledge about the geomorphological and forest elements of interest***

The MELCC will target certain needs related to knowledge building on biodiversity. For example, a plant inventory must be done. A list of fish species in the lakes, and of the reserve's terrestrial wildlife, could be created with the help of regional partners in the wildlife field. More knowledge is needed about the various species

(flora and fauna) associated with the ecosystems of old noble hardwood forests, such as the stands of sugar maple in the reserve. With regard to physical characteristics, more knowledge is needed about the plant species associated with the dune ecosystems, wetlands, moraine and eskers on the territory. Other surveys or scientific research, whether on existing or anticipated ecological problems, could be conducted later.

- ***Monitor anthropic impacts on Lac Lemoine***

The high occupation level, usage and shoreline development projects at Lac Lemoine combine to create a need for better understanding of their current and anticipated impacts on the lake. It will also be important to monitor the lake's water quality, and its aquatic and riparian ecosystems.

2.3 Integrated and participative management

In light of the reserve's large size and the heterogeneity of its natural environments, as well as the variety of modes of occupation and use that are present, the management approach adopted should be based on stakeholder participation. This will facilitate the harmonious management of recreational activities while protecting the natural heritage. The concentration of cottagers on the shores of Lac Lemoine, not far from downtown Val-d'Or, adds a significant social dimension to the area. This dimension should be taken into consideration in managing the biodiversity reserve.

Specific objectives:

- ***Establish participative and collaborative management***

Réserve de biodiversité de la Moraine-d'Harricana extends about 65 km over its length. Its natural and human contexts are highly varied.

For this reason, the MELCC should engage the participation of the various users and holders of land rights (outfitter with non-exclusive rights, cottagers, hunters and trappers), the cities of Rouyn-Noranda and Val-d'Or, and the municipality of Rivière-Héva, in managing the reserve. The Algonquin communities will also be important partners in managing the reserve, since they practise traditional activities there, particularly in the beaver reserve.

The MELCC will encourage the creation of a conservation committee where stakeholders can discuss protection issues and the measures to take in response. An action plan will be prepared by the MELCC in collaboration with management partners. Among other things, the plan will determine actions to be taken, the means advocated, actors chosen to perform those actions, performance horizons, and a mechanism for evaluating results.

- ***Accord particular attention to the management of Lac Lemoine***

In view of the significant human presence at Lac Lemoine, its shores and immediate environs, a component specifically concerned with that part of the reserve should be incorporated in the participative management process.

3. Zoning

Réserve de biodiversité de la Moraine-d'Harricana covers an area that is highly diverse in terms of natural habitats, modes of occupation and use, and the general state of the environment. Management of the territory should take into account the ease with which certain parts can be accessed, especially from the northeast. Based on the ecosystems present, the current state of the natural environment, the reserve's protection and management objectives, and to a lesser extent considerations of land use

and occupation, the reserve has been divided into five zones. All five have a protection level and the same activity framework. However, protection measures and development possibilities will reflect the specific features of each zone. All five have elements of ecological interest (or that must be preserved) that are specific to them, such as old hardwood forests, a variety of wetlands, kettles or sand dunes.

A map of the zones is provided in Appendix 4. This zoning, and the particular characteristics of each zone, will be taken into account in the MELCC's management of the reserve and when evaluating authorization requests for activities and improvements.

The five zones are:

- Zone I: Low hills of till
- Zone II: Moraine d'Harricana
- Zone III: Silty clay plain with mounds
- Zone IV: Lac Lemoine
- Zone V: Wet clay plain

Zone I: Low hills of till

This zone is part of a larger complex of low hills in the area between Lac Simard and Réservoir Decelles. Zone I covers 46 km², or about 13% of the territory of the reserve.

Zone I can be considered a "natural" zone despite its visible human footprint, particularly in the northern part where logging was done in the 1990s. The portion south of the power transmission line is characterized by forests of medium age or older. Disturbed sections are mostly the result of burning in the late 1960s or early 1970s. Many of the low hills have very thin soil and steep slopes. The sizeable mound to the east of the zone, and certain slopes, favour the presence of yellow birch-balsam fir stands. The rest of the low hills, and the silty clay lowlands

south of Lac Godard, have ecosystems favourable to stands of balsam fir (with black spruce or white birch) and stands of black spruce (with peat moss, mosses or heaths). The more recently logged areas have been colonized by stands of shade-intolerant deciduous trees, while black spruce stands and jack pine stands occupy most of the rest of the zone. Also of interest is the presence of a stand of red maples along the southeast boundary of Zone I. This zone is the one with the fewest wetlands.

Though the forest landscape of Zone I is not entirely natural, the level of occupation is relatively low. Nonetheless, the fragmentation rate is high. There is a periodic but significant human presence (mostly for hunting). The network of trails and forest roads covers 110 linear km, but seems to be limited to access roads to buildings. There are just ten buildings in the zone, all hunting camps. The occupation rate is thus fairly low, at one building per 4.6 km². The fragmentation index for Zone I is 2.4 km per km², which is considered high (Quigley *et al.*, 2001).

The conservation objective for this zone to improve its natural character where logging has been done, and to reduce the fragmentation rate by limiting the number of roads and trails to those that are essential. Active management measures such as planting or restoration will not be needed.

Zone II: Moraine d'Harricana

Zone II is the largest zone in the biodiversity reserve. It covers 158 km², or about 43% of the area of the reserve, and offers a great variety of ecosystems and landscapes. Zone II encompasses the portion of the Harricana moraine that crosses the reserve, along with all the natural environments associated with it, such as the complex of dunes and bogs. The map in Appendix 2 illustrates the large number of elements of ecological interest in this zone.

That variety is not reflected in the zone's forest ecosystems. On the contrary, the whole of Zone II is favourable to the development of just two types of woodland: on the moraine, to stands of balsam fir (with black spruce or white birch), and on the complex of dunes and bogs south of the moraine, to stands of black spruce (with mosses, heaths or peat moss). A few isolated ecosystems are favourable to balsam fir-red maple stands.

Nonetheless, the situation observed on the ground is quite different from what would be expected. The landscape is dominated by black spruce stands, a few stands of jack pine and white birch, and sections that have been logged. The central portions west of the Hydro-Québec property are dominated by forests of medium age, while young regenerating forests dominate the area southeast of Lac Lemoine. As with Zone I, mature and old forests are scattered and very rare.

Human presence and the traces of human use vary in density and intensity in different parts of the zone. There are forty buildings, including six cottage leases and over thirty hunting camps. The occupation rate is about one building per 4 km², which is relatively low. This is because the boundaries of the reserve were drawn to exclude the resort areas concentrated around Lac Lemoine, which are encompassed by the reserve without being part of it. This encompassed human presence will nonetheless have to be taken into account in the management of the reserve. The network of forest roads and trails extends over about 415 linear km, which according to Quigley *et al.* (2001) represents a high fragmentation index. The density of roads is particularly high in the area where there are kettles.

No active management measures are anticipated in the short term. However, due to the high fragmentation rate and the numerous young stands repopulating logged areas, the

conservation objective for Zone II is to promote, as effectively as possible, a return to a high naturalness index, i.e. to natural landscapes. With regard to fragmentation, the roads and trails should be examined to determine which ones are essential for building access. Those that are not should be closed and renaturalized. Finally, some parts of Zone II have been planted with jack pine. Consideration should be given to monitoring the evolution of these ecosystems of non-natural origin.

Due to the marks it bears of human activity and its high fragmentation index, Zone II resembles a "developed natural" zone. However, the level of occupation is low and in significant portions the landscape is natural, especially where there is a concentration of wetlands. Management of this zone should therefore allow it to recover its natural character over the long term.

Zone III: Silty clay plain with mounds

This zone is formed of an array of mounds on a plain of glaciolacustrine origin with deposits of clay and silt. It covers 64 km², or about 18% of the territory of the reserve. The mounds offer an environment favourable to stands of balsam fir (with black spruce or white birch), while the silty clay lowlands favour stands of black spruce (with peat moss, mosses or heaths). A few portions of Zone III were clearcut in the 1980s. However, the main human footprint consists of sections that were logged with protection for regeneration in 2008-2009. Since the mounds were spared, today they are covered with white birch stands, a few yellow birch stands and even a stand of red maple. Moreover, despite the several cases of human disturbance, Zone III has the largest number of mature and old forests, which cover the mounds and hillocks of till.

There are thirty land rights in Zone III, including eight cottage leases on the shores of Réservoir Decelles, the remaining twenty-two being for temporary shelters. The level of occupation is high in this zone, at one building per 2 km². There is little overland access to Zone III, but it is easily accessed by boat through Réservoir Decelles. The fragmentation index is high (Quigley *et al.* 2001). There are about 109 linear km of forest roads and trails, representing a fragmentation index of 1.7 km per km². Many of the roads were built in preparation for the logging operations of 2008-2009. Their footprint will remain for a few more years.

The main conservation objective for this zone is to maintain the characteristics of mature and old forests and to promote the resilience of forests that were recently logged. Any new fragmentation must be limited, except for efforts to enhance the area's educational or ecotourism dimensions (e.g. hiking trails, shelters, interpretive panels). In the medium term, only roads to existing buildings should be maintained.

Zone III can be considered a "natural" zone. As such, it will be managed with a view toward increasing its naturalness, notably with respect to any new development or fragmentation, while pursuing objectives related to ecosystem resilience.

Zone IV: Lac Lemoine

Lac Lemoine constitutes a distinct zone on its own. With its proximity to downtown Val-d'Or, intensive use of the lake and the development of its shores, Lac Lemoine is under greater human pressure than the rest of the reserve. There are a great many cottages along its shores. Although most are excluded from the boundaries of the reserve, Zone IV must be managed as if that human presence were part of the reserve. The concentration of buildings along the shore could,

in places, have significant impacts on the lake, its water quality and the quality of its aquatic ecosystems.

Zone IV can be considered a "humanized" zone. The cottages and residences around Lac Lemoine are estimated at over 200, yet Zone IV only covers about 23 km², for some 50 km of shoreline. The average occupation density is one building every 250 metres, which is very high. Not to mention the considerable human presence upstream and downstream from Lac Lemoine, along the Thompson and Piché rivers and at Lac Mourier. In short, the balance between this human presence and the quality of ecosystems is a matter of serious concern. Residents and cottagers could be important partners in protecting the lake effectively.

Zone V: Wet clay plain

The area north of Lac Lemoine is different from the rest of the reserve, primarily because of its relatively flat topography. Representative of the great silty-clay glaciolacustrine plain typical of Abitibi, the zone has numerous wetlands. Some hillocks of till and a few small eskers add diversity to the plain's homogeneity.

Zone V also offers an environment favourable to the development of stands of balsam fir (accompanied variously by white birch, black spruce, black spruce-peat moss), and stands of black spruce (accompanied by peat moss, mosses or heaths). The peculiarity of Zone V is that it has a few areas favourable to the establishment of balsam fir-yellow birch stands. This is where the reserve's rare stands of yellow birch are found. Apart from them, most of the present vegetation consists of young stands of conifers with regenerating hardwoods. This is why the few stands of black spruce are surrounded by stands of shade-intolerant deciduous trees.

The flat relief and its few depressions, combined with poor drainage, have resulted in the presence of a good number of wetlands. These include large ombrotrophic and minerotrophic bogs, as well as numerous shrubby and coniferous swamps.

Human presence and landscape fragmentation are primarily of note in the northern part of Zone V. There are numerous four-wheel, snowmobile and bicycle trails, and old access roads, entering the reserve from the north. Many of the roads are no longer passable and soon will no longer be visible. Nonetheless, the current fragmentation index for Zone V is 1.8 km per km², or 132 linear km of forest roads and trails for an area of 73 km². According to Quigley *et al.* (2001), this a high rate of fragmentation.

There are 24 buildings in the zone, including 6 cottages and 18 hunting camps. The occupation rate is one building per 3 km², which is relatively low.

The conservation objective for this “natural” zone will be to reduce fragmentation by only maintaining roads and trails that currently provide access to buildings. However, educational/recreational trails for non-motorized outings could be developed, in keeping with the recreational vocation of Forêt Piché-Lemoine. Protection of the rare stands of yellow birch is of course among the specific conservation objectives of this zone.

4. Activity framework applicable to Réserve de biodiversité de la Moraine-d’Harricana

The purpose of the reserve is to protect natural environments and their components. For this reason, activities that could have a significant impact on ecosystems and biodiversity, especially of an industrial nature, are prohibited.

Less harmful activities and occupations, such as those involving recreation, wildlife, ecotourism or education, are however permitted in this type of protected area.

In sum, the biodiversity reserve should be considered as a territory dedicated to protecting the natural environment, to nature discovery and to recreation.

4.1 Activity framework established by the Natural Heritage Conservation Act

Activities carried out within the biodiversity reserve are primarily governed by the provisions of the *Natural Heritage Conservation Act* (chapter C-61.01).

Under the Act, the activities prohibited in an area with the status of biodiversity reserve are primarily the following:

- mining and gas or oil extraction;
- forest management within the meaning of section 4 of the *Sustainable Forest Development Act* (chapter A-18.1);
- the exploitation of hydraulic resources and any production of energy on a commercial or industrial basis.

Though fundamental to protecting the territory and its ecosystems, the above prohibitions do not cover all of the standards considered desirable to ensure the proper management of the reserve and the conservation of its natural environment. The *Natural Heritage Conservation Act* allows the Regulation to detail the legal framework applicable on the territory of a biodiversity reserve.

4.2 Activity framework established by the Regulation respecting the Réserve de biodiversité de la Moraine-d'Harricana

The provisions contained in **Regulation respecting the Réserve de biodiversité de la Moraine-d'Harricana** set out additional prohibitions beyond those already stipulated in the *Natural Heritage Conservation Act* (chapter C-61.01). They also provide a framework for certain permitted activities, to ensure the protection of the natural environment in accordance with the principles of conservation and other management objectives of the reserve. Certain activities are therefore subject to prior authorization by the Minister.

The measures presented in Regulation concern new interventions in particular, and generally do not affect activities that are already being practised or facilities that are already present. Many existing uses are thus preserved.

In listing the activities requiring authorization, Regulation does not identify which ones would be considered incompatible with the vocation of the reserve and could therefore be refused authorization. Basic information about the compatibility or incompatibility of each type of activity is provided in the document *Activity Framework for Biodiversity Reserves and Aquatic Reserves*, which is available on the website of the MELCC at

http://www.mddelcc.gouv.qc.ca/biodiversite/aires_protegees/regime-activites/regime-activite-reserve-bio-aqua-en.pdf.

Note that certain activities are exempted from the requirement to obtain authorization. These exemptions are also presented in Regulation.

5. Activities governed by other laws

Certain activities that could potentially be practised in the biodiversity reserve are also

governed by other applicable legislative and regulatory provisions, and some require a permit or authorization or the payment of certain fees. Certain activities could be prohibited or limited under other laws or regulations applicable on the territory of the reserve.

In the territory of Réserve de biodiversité de la Moraine-d'Harricana, a particular legal framework may govern permitted activities under the following categories:

- **Protection of the environment:** measures stipulated by the *Environment Quality Act* (chapter Q-2) and its regulations;
- **Archeological research and discoveries:** measures stipulated by the *Cultural Heritage Act* (chapter P-9.002);
- **Exploitation and conservation of wildlife resources:** measures stipulated by the *Act respecting the conservation and development of wildlife* (chapter C-61.1) and its regulations, including provisions related to threatened or vulnerable wildlife species, outfitters and beaver reserves, and measures in the applicable federal laws and regulations, including the legislation and regulations on fisheries;
- **Plant species designated as threatened or vulnerable:** measures prohibiting the harvesting of such species under the *Act respecting threatened or vulnerable species* (chapter E-12.01);
- **Access and property rights related to the domain of the State:** measures stipulated by the *Act respecting the lands in the domain of the State* (chapter T-8.1) and by the *Watercourses Act* (chapter R-13);

- **Issuance and oversight of forest development permits** (harvesting of firewood for domestic purposes, wildlife development, recreational development); and **delivery of authorizations** (forest roads): measures stipulated by the *Sustainable Forest Development Act* (chapter A-18.1);
- **Travel:** measures stipulated by the *Act respecting the lands in the domain of the State* and by the regulations on motor vehicle travel in fragile environments, under the *Environment Quality Act*;
- **Construction and development standards:** regulatory measures adopted by local and regional municipal authorities in accordance with the applicable laws.

6. Management

6.1 Responsibilities of the Minister of Environment and the Fight against Climate Change

The Minister of Environment and the Fight against Climate Change is responsible for the management of the reserve. Among other things, the Minister sees to the application of the *Natural Heritage Conservation Act* (chapter C-61.01) and the Regulation respecting the Réserve de biodiversité de la Moraine-d'Harricana. In managing the reserve, the MELCC enjoys the collaboration and participation of other government representatives that have specific responsibilities in or adjacent to the territory.

6.2 Monitoring

As mentioned in section 2, "Conservation and development of Réserve de biodiversité de la Moraine-d'Harricana", measures will be taken toward monitoring the status of the natural

environment, in collaboration with the following local and regional partners: municipal stakeholders, partners in the areas of environment, recreation and education, and residents, cottagers, hunters, fishers, trappers, etc.

6.3 Participation of stakeholders

As mentioned in section 2, "Conservation and development of Réserve de biodiversité de la Moraine-d'Harricana", the MELCC will seek the collaboration and participation of stakeholders in managing the reserve. Its intention is to draw up an action plan to guide management in protecting and enhancing the territory and its resources. The MELCC will prepare the plan in collaboration with the regional actors concerned. A participation and consultation mechanism for local stakeholders will be worked out by the MELCC on the basis of local and regional territorial realities.

Management of the biodiversity reserve will respect the following conservation principles:

- maintain natural ecosystem dynamics;
- restore or facilitate the restoration of disturbed ecosystems in the short and medium terms;
- respect the support capacity of ecosystems;
- maintain non-industrial harvesting activities, without encouraging their development;
- gather and disseminate knowledge about the natural and cultural heritage;
- participate in the management of adjacent areas to ensure harmonization with the conservation objectives pursued within Réserve de biodiversité de la Moraine-d'Harricana.

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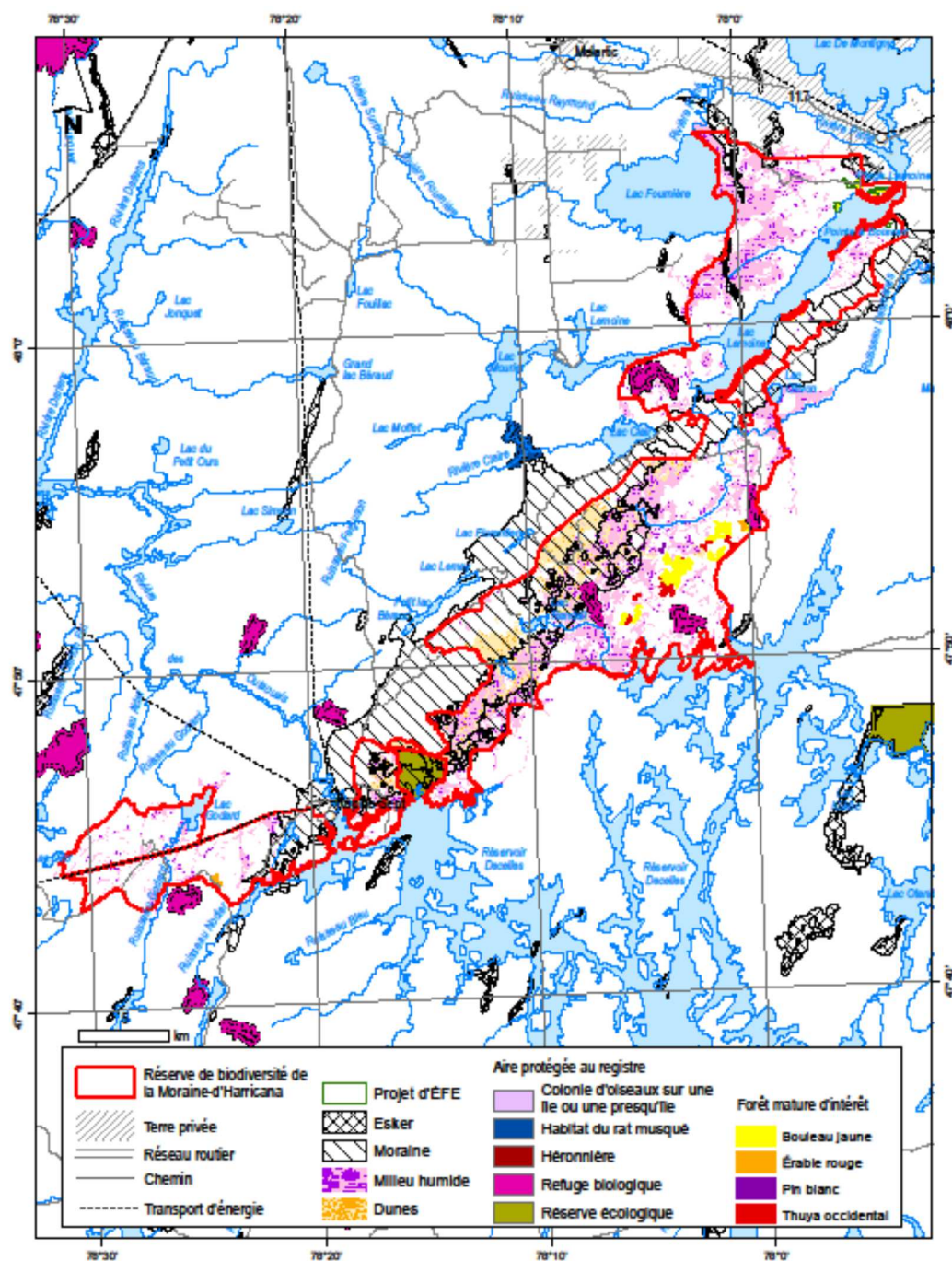
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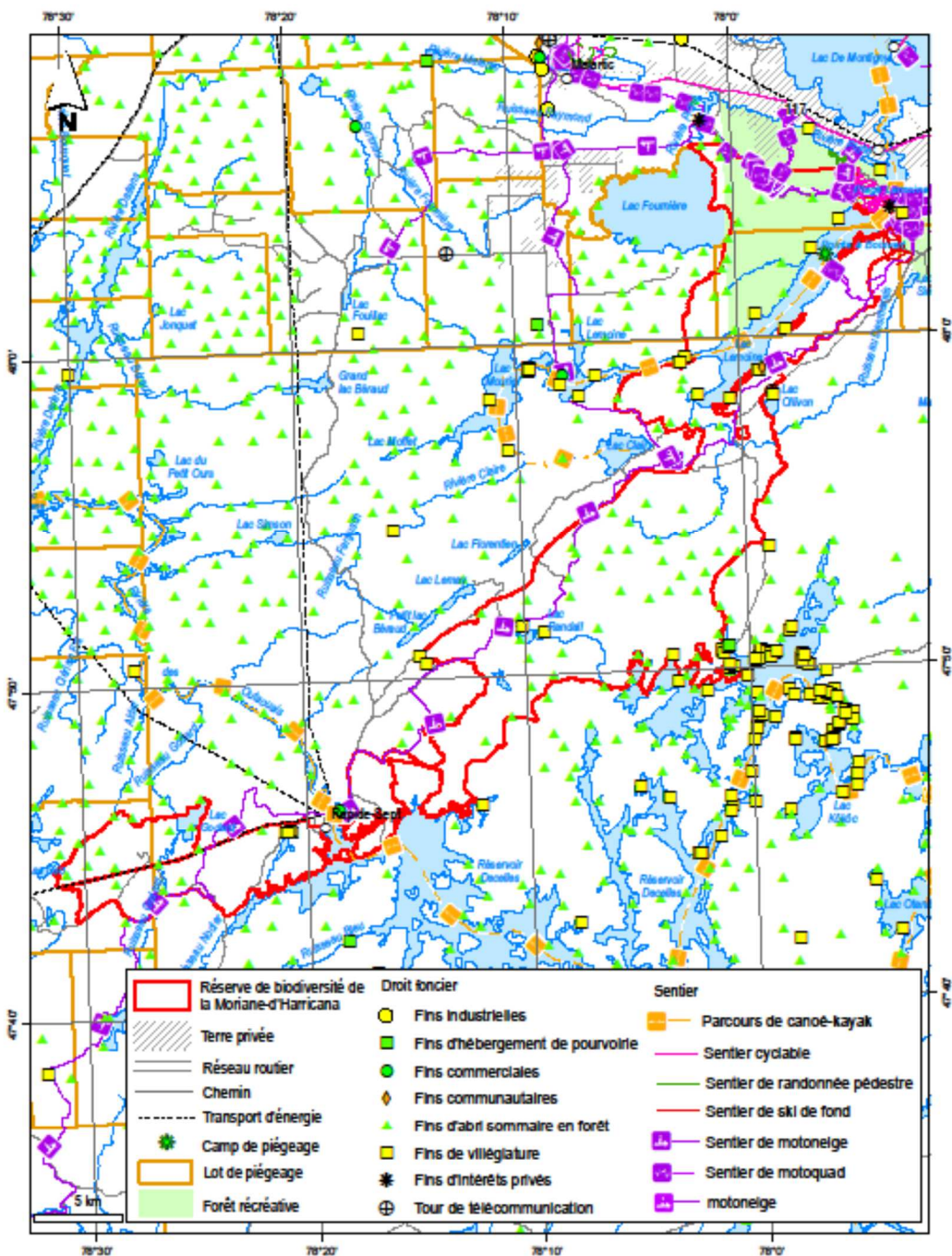
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[illegible]

Appendix 2 — Réserve de biodiversité de la Moraine-d'Harricana: Elements of ecological interest



Appendix 3 — Réserve de biodiversité de la Moraine-d'Harricana: Land occupation and uses



Appendix 4 — Réserve de biodiversité de la Moraine-d'Harricana: Zoning

