3 Profile of the Abitibi-Témiscamingue administrative region

3.1 Description of the territory and territorial organization

The Abitibi-Témiscamingue region covers 64 656 km² (Institut de la Statistique du Québec, 2010), equivalent to roughly 3.9% of Québec's geographic area. Dry land accounts for 57 339 km² or 88% of the region. Some 85% of the Abitibi-Témiscamingue region is made up of public lands (MRNF, 2011) and private lands there are concentrated mainly in the MRC d'Abitibi-Ouest and the MRC d'Abitibi, and near Rouyn-Noranda, Val-d'Or, Senneterre, Témiscaming and Ville-Marie.

The Abitibi-Témiscamingue region encompasses five RCMs: Abitibi-Ouest, Abitibi, Vallée-de-l'Or, Rouyn-Noranda (a city that exercises the jurisdiction of an RCM) and Témiscamingue. The Abitibi-Témiscamingue region encompasses 65 municipalities and 10 unorganized territories, four Indian reserves (Kebaowek, Lac-Simon, Pikogan and Timiskaming) and three Amerindian settlements (Hunter's Point, Grand-Lac-Victoria and Winneway). In 2010, the region's population stood at 145 835 inhabitants, equivalent to 1.8% of Québec's population. It is divided into the French-speaking and Aboriginal cultural communities, mainly concentrated around the urban centres of Rouyn-Noranda, Val-d'Or, Amos, Ville-Marie, Témiscaming and Senneterre.

Generally speaking, the region is perceived as being distant from the province's urban centres. Indeed, it is removed from the main freight transportation routes. The region's remoteness engenders additional costs that affect the price of consumer goods and the possibility of establishing new businesses. Moreover, the territory of the Réserve faunique La Vérendrye acts as a buffer zone and exacerbates the region's remoteness (MRNF, 2006).

The main roads in the region are Route 117, the main link to southern Québec, which also carries traffic toward Ontario and western Canada, Route 101, an important link toward southern Ontario, and Route 109 and Route 113, which link the region to the James Bay region and the Saguenay–Lac-Saint-Jean region, respectively, via Chibougamau. The relative proximity to Ontario and the United States brings visitors to the region, especially to holiday resorts and outfitting operations (MRNF, 2006).

In addition to the main road network a network of secondary roads and access roads to forests and mineral resources make the public territory more accessible. Most of the roads are under the responsibility of users, mainly logging companies and mining companies. Road maintenance often becomes problematical when the companies no longer assume responsibility for it. In this context, the quality of the roads varies considerably and accordingly limits access to the territory in several sectors for other users such as resort vacationers, hunters, fishermen, and so on. The southern and eastern portions of the region are almost exclusively crisscrossed by this type of access roads (MRNF, 2006).

There are two regional airports, one in Val-d'Or and the other one in Rouyn-Noranda. Both airports serve Montréal, Québec City and Northern Québec (MRNF, 2006). There are four local airports serving the region, in Senneterre, Amos, La Sarre and Saint-Bruno-de-Guigues. The region also has two navigable waterways, i.e. on the Rivière Harricana supérieur and on Lac Témiscamingue and the Ottawa River (MRNF, 2006).

Table 1. Administrative and territorial organization of the Abitibi-Témiscamingue region

RCM	Area RCM/Region (%)	Indian reserves and settlements	Number of municipalities	Population	Population (%)
Rouyn-Noranda	9.4	0	1	40 891	28.0
Vallée-de-l'Or	42.8	2	6	42 815	29.4
Témiscamingue	29.8	4	20	16 550	11.3
Abitibi-Ouest	5.3	0	21	20 787	14.3
Abitibi	12.6	1	17	24 792	17.0
Total	—	7	65	145 835	100

Source: ISQ, 2010

3.2 Ecological profile

3.2.1 Physical environment

The description of the geomorphology, hydrography and climate of the Abitibi-Témiscamingue region is of considerable importance for the establishment and understanding of protected areas, especially biodiversity reserves and aquatic reserves. Indeed, the process of selecting territories that are representative of biodiversity hinges, among other things, on the protection of territories according to the diversity of the physical environment. Accordingly, the first step in selecting territories for the purpose of establishing a biodiversity reserve or an aquatic reserve is to determine the sites that are representative of the diversity of geomorphological forms or formations. This initial step is based on an analysis of physiographic units in the Abitibi-Témiscamingue region, i.e. level 3 of the ERF (see 3.6.1 for more details on the levels of ERF). The selection of territories of interest is then refined by an analysis of the representativeness of biological components, followed by an analysis of economic constraints.

Geology

The Abitibi-Témiscamingue administrative region straddles the Grenville and Superior geologic provinces in the Canadian Shield (Figure 4), a geologic foundation mainly made up of volcanic rock but also sedimentary and metamorphic rock. Of the eight protected areas covered by this public consultation, four are located in the Grenville Province, and four in the Superior Province.

The Grenville Geologic Province, which occupies the southern portion of the region, is characterized by rocks formed by orogeny that occurred between 1.5 billion and 900 million years ago and mainly comprises felsic, intermediate or gneissic rock (acidic rock). The rocks are characterized by the complexity of structural deformations and a high degree of metamorphism (Veillette *et al.*, 2000).

The Superior Geologic Province, made up of older rocks dating as far back as 2.7 billion years, is divided into the Abitibi and Pontiac sub-provinces. The Abitibi Subprovince is made up of alternating volcanic and sedimentary rock as well as numerous granite intrusions. It is the world's biggest Archean volcano-sedimentary ensemble. The Pontiac Subprovince is an Archean core (over 2.9 billion years) that integrated into the basement of the Superior Geologic Province in the early Proterozoic (between 2.7 billion and 2.6 billion years ago). The geological composition of the substratum (granitic rock and paragneiss) has greater resistance to erosion than the geological composition of the more northerly territories (volcanic and sedimentary rock).

The geology of the Abitibi-Témiscamingue region comprises systems of compound faults usually running east-west that delineate the granite intrusions. Certain faults, such as the Cadillac-Larder Lake Fault, have significant mining potential because of their propensity for mineralization.

Geomorphology

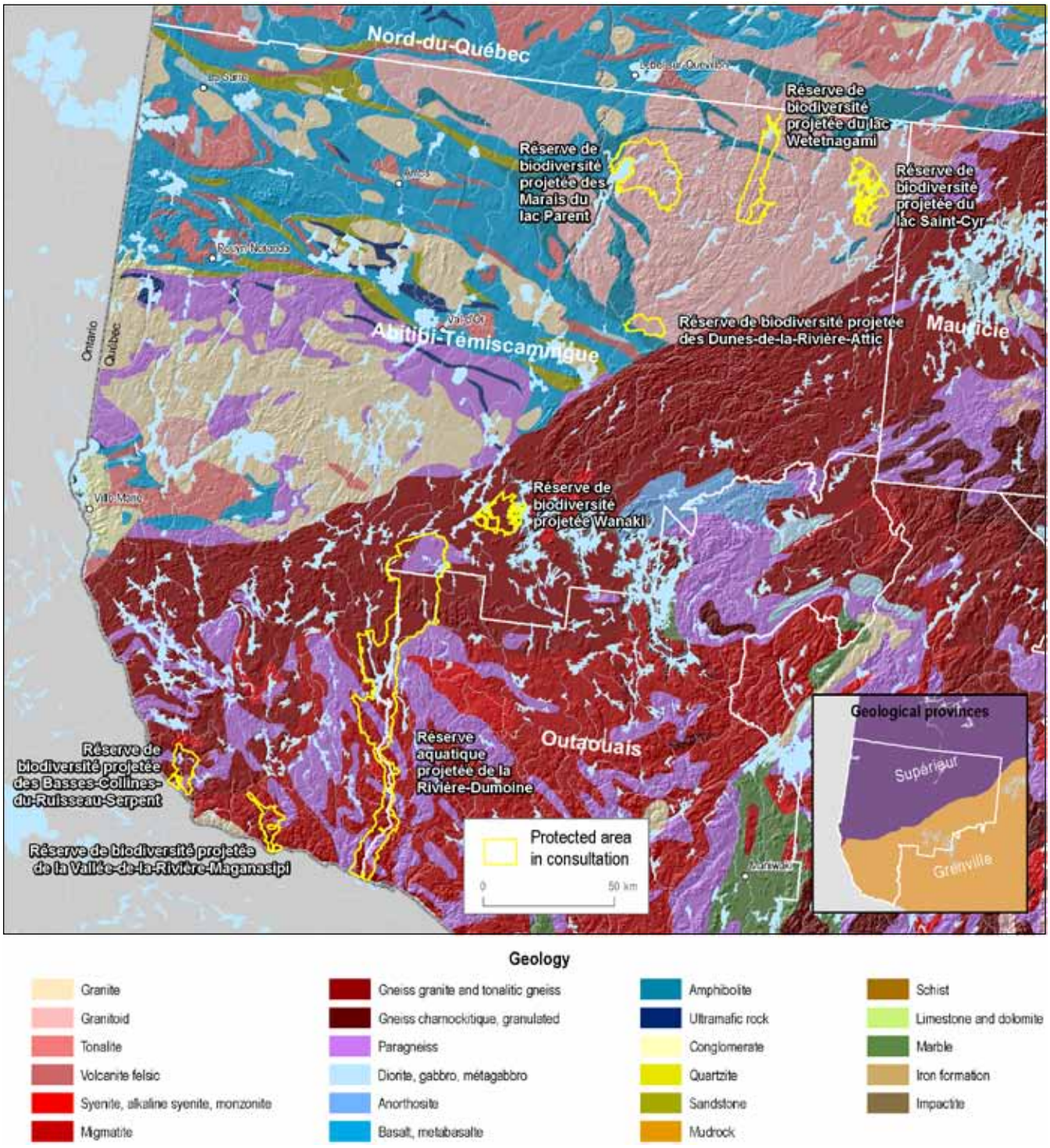
The Abitibi-Témiscamingue administrative region wholly or partially encompasses three natural provinces of the ERF (Figure 5). Of the eight proposed protected areas that this information document covers, four are located in the Southern Laurentians natural province, i.e. the Rivière-Dumoine, Wanaki, Basses-Collines-du-Ruisseau-Serpent and Vallée-de-la-Rivière-Maganasipi areas. Three other areas are wholly or partially located in the Mistassini Highlands natural province, i.e. the proposed Lac Wetetnagami, Lac Saint-Cyr and Marais du lac Parent biodiversity reserves. However, the latter reserve also straddles the Abitibi and James Bay Lowlands natural province where the Réserve de biodiversité projetée des Dunes-de-la-Rivière-Attic is entirely located.

The history of the Quaternary epoch explains the major geomorphological formations now in place. The Abitibi and James Bay Lowlands natural province, a rolling plain interspersed with low hills sloping slightly towards James Bay whose general altitude ranges from 350 m to the southeast to sea level on the shores of James Bay, is noteworthy for the presence of vast expanses of clay and silt. These fine deposits result from the grinding by ice of rock and their movement over long distances to settle in the calm waters of proglacial lakes, in this instance Lac Barlow and Lac Ojibway, where the glaciolacustrine deposits originated. The two lakes resulted from the retreat of the glacier and occupied the territory between 8 000 and 10 000 years ago. The lakes were formed by glacial meltwater trapped between higher ground to the south and the glacial snout. However, roughly 8 000 years ago, Glacial Lake Ojibway emptied into Hudson Bay since the glacier retreating northward no longer trapped its waters and the depression that the weight of the glacier created disappeared due to the isostatic rebound.

The two natural regions located in the Abitibi region, i.e. the Lac Témiscamingue Lowlands natural region and the Abitibi Plain natural region, clearly reveal past events and have a high proportion of ecosystems based on clay and silt (Figure 6). The Réserve de biodiversité projetée des Dunes-de-la-Rivière-Attic and the Réserve de biodiversité projetée des marais du lac Parent are located in the Abitibi Plain natural region. The second proposed biodiversity reserve protects barely permeable argillaceous environments dotted with big peat bogs. The first proposed biodiversity reserve protects ecosystems in which sand and gravel have been transported by the immense rivers under or downstream from the glacier during the period of deglaciation. In this area, the finest sand was subsequently transported by the prevailing winds and formed eolian deposits (dunes), many of which are located in the protected area.

Moreover, the retreat of the glacier in this sector engendered other phenomena of interest, particularly the glaciofluvial formations that created, notably, the Harricana interlobate moraine and numerous eskers that trap groundwater of high quality. The groundwater formed there because of the upper porous layers of sand and gravel through which rainwater trickled down and a highly impermeable clay foundation that prevented the water from trickling deeper. Moraine is defined as till from rock on the site eroded by a glacier then transported and deposited by the glacier. Till is, accordingly, associated with glacial deposits.

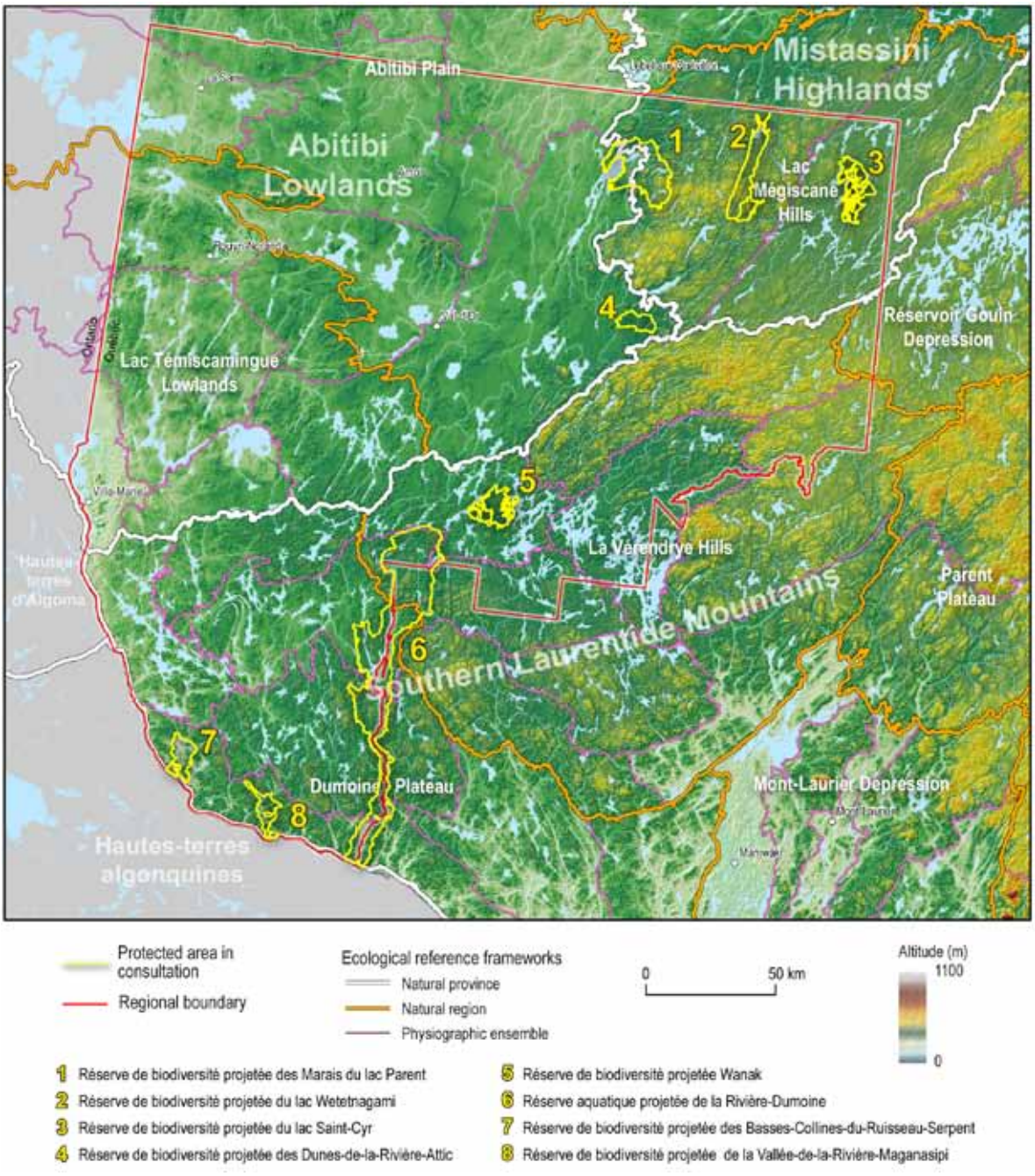
Figure 4. The geologic provinces of the Canadian Shield



The Mistassini Highlands natural province is characterized by much more uneven topography (Figure 5) and consists mainly of glacial deposits (till). It is a big plateau dotted with hills ranging from 350 m to 550 m in height. The Abitibi portion of this natural province is occupied by the Mégiscane Lake Hills natural region. This territory is mainly made up of till, a heterogeneous ensemble of blocks of mixed sand, silt and clay of varied volumetry. Because the region is mainly made up of a granite substrate, a hard rock, the till found there is has a rather coarse texture. The Réserve de biodiversité projetée du lac Saint-Cyr and the Réserve de biodiversité projetée du lac Wetetnagami and the eastern half of the Réserve de biodiversité projetée des marais du lac Parent are located in this natural region.

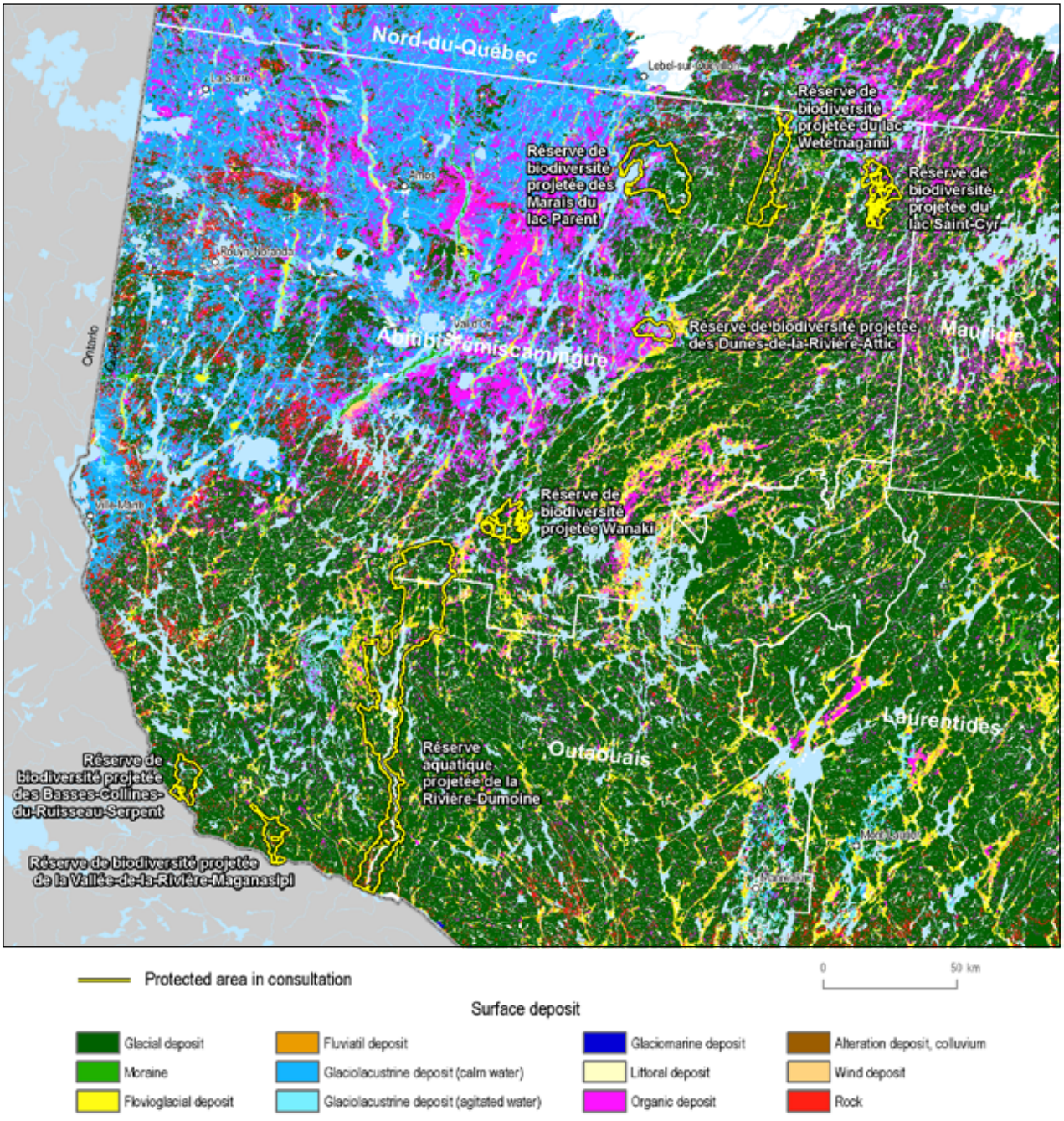
The Southern Laurentians natural province occupies the southern portion of the MRC de La Vallée-de-l'Or and the Témiscamingue region in the form of two natural regions, i.e. the Dumoine Plateau natural region on the Témiscamingue region and the La Vérendrye Hummocks natural region, in the eastern part of the region. These sectors have been less affected by the presence of Lac Barlow and Lac Ojibway because of their higher altitude than the Abitibi lowlands,

Figure 5. Ecological reference framework for the Abitibi-Témiscamingue administrative region



which explains the scarcity of ecosystems based on clay deposits. Till is the predominant surface deposit, in particular on the hills and plateaus, while glaciofluvial deposits occupy valleys and depressions. This portion of the Abitibi-Témiscamingue region corresponds to the Grenville Geologic Province, which mainly comprises gneiss. The two natural regions, which are representative of their natural province, are more heterogeneous from the standpoint of the landforms that make them up, compared with the physiography of the two natural provinces described previously. The regions include, among other things, low hills, plateaus and depressions interspersed here and there with higher massifs. In the Abitibi-Témiscamingue portion of the regions, the massifs can attain an altitude of 600 m. The Réserve de biodiversité projetée des Basses-Collines-du-Ruisseau-Serpent and the Réserve de biodiversité projeté de la Vallée-de-la-Rivière-Maganasipi as well as three-quarters of the southern portion of the Réserve aquatique projetée de la Rivière-Dumoine are located in the Dumoine Plateau natural region, while the northern portion of the Rivière-Dumoine protected area and the Réserve de biodiversité projetée Wanaki are located in the La Vérendrye Hummocks natural region.

Figure 6. Surface deposits – Abitibi-Témiscamingue region

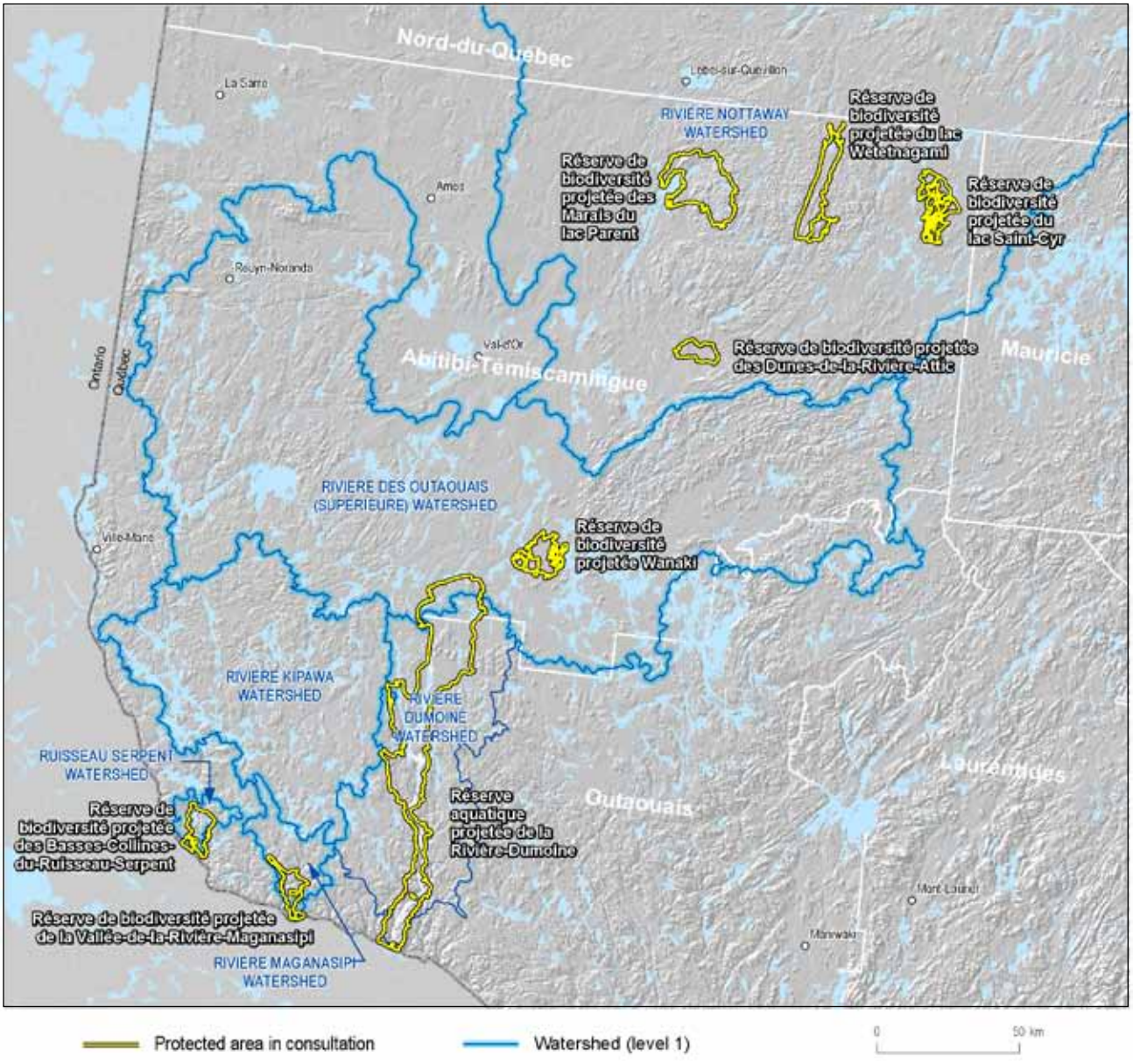


Hydrography

The territory of the Abitibi-Témiscamingue region is divided by two major drainage basins (Figure 7). The northern portion of the Abitibi region is drained the drainage basins of the Rivière Harricana and the Rivière Nottaway, both of which flow into James Bay. The territory covers, in particular, Val-d'Or, Amos, Senneterre and La Sarre. On the eastern edge, roughly in the territory of the Ville de Senneterre, near the Mauricie region, local drainage occurs westward through the Rivière Mégiscane, which, however, flows northward through the Rivière Bell, which forms Lac Parent. The general direction of drainage in the drainage basin of the Rivière Nottaway, to which the Rivière Bell belongs, is northeast-north to James Bay. As for the western portion near Amos, La Sarre and Val-d'Or, i.e. the Rivière Harricana drainage basin, the general drainage is due north to James Bay. Such drainage corresponds to the general topography of the Abitibi and James Bay Lowlands natural province. Four proposed biodiversity reserves are located in the Rivière Nottaway drainage basin, i.e. des marais du lac Parent, du lac Wetetnagami, du lac Saint-Cyr and des Dunes-de-la-Rivière-Attic.

The southern portion of the MRC de La Vallée-de-l'Or, most of the Ville de Rouyn-Noranda and all of the MRC de Témiscamingue are part of the drainage basin of the Ottawa River. Most of the territory is drained by the upper drainage basin of the river while the southern portion of the Témiscamingue region is drained, above all, by the Rivière Kipawa and the Rivière Dumoine. In the upstream portion located in the eastern part of the administrative region,

Figure 7. Drainage basins in the Abitibi-Témiscamingue region



the Ottawa River flows westward through the Dozois reservoir, Grand Lac Victoria, the Decelles reservoir, and Lac Simard and Lac des Quinze. However, in the southern portion of its drainage basin, where the river begins its downstream course, general drainage flows in a southwesterly direction. The drainage basin of the Rivière Kipawa also flows westward to the Ottawa River. The Rivière Dumoine drains a territory southward. The Réserve de biodiversité projetée Wanaki is located in a territory that lies between the Dozois reservoir and Grand Lac Victoria. The Réserve de biodiversité projetée des Basses-Collines-du-Ruisseau-Serpent and the Réserve de biodiversité projetée et de la Vallée-de-la-Rivière-Maganasipi are located in local drainage basins whose names they bear and that flow directly into the Ottawa River.

The Abitibi-Témiscamingue region has 20 034 lakes with a total area of 5 870 km^2, equivalent to roughly 9% of the geographic area of the administrative region (FAPAQ, 2002). The MRC de Témiscamingue (7 544 lakes) and the MRC de La Vallée-de-l'Or (11 301 lakes) share most of the water bodies in the region. Of the 20 034 lakes, fewer than a dozen have an area of over 100 km^2, i.e. Lac Témiscamingue, Lac Kipawa, Lac Abitibi, Lac des Quinze, Lac Decelles, Lac Dozois and Lac Parent. However, only Lac Abitibi and Lac Parent are natural lakes. The others are power-pools whose level is maintained or managed artificially. Among the other big lakes in the region, mention should be made of Lac Preissac, Lac Macamic, Lac Duparquet, Lac Malartic, Lac Blouin, Lac Lemoine, Lac Mégiscane and Lac Dufault. Most of the lakes are used for fishing, boating or holiday resorts.

The lakes are generally shallow and several have clay bottoms that are productive and favourable to the growth of aquatic vegetation (Ducks Unlimited, 2009). The main rivers in the region are the Rivière Mégiscane, the Rivière Harricana, the Upper Ottawa River, and the Rivière Maganasipi.

Table 2. Main water bodies in the Abitibi-Témiscamingue region

Lakes	Area (km^2)	Vocation/use
Témiscamingue*	306	Sport and commercial fishing, boating, residential
Kipawa*	300	Fishing, boating, holiday resorts, residential
Abitibi	878	Fishing, boating, holiday resorts, residential
Des Quinze*	145	Fishing, boating, holiday resorts, residential
Decelles*	203	Fishing, boating, holiday resorts, residential
Dozois*	335	Fishing, canoe-camping
Parent	122	Fishing
Preissac	73	Fishing, holiday resorts, residential
Macamic	45	Fishing, boating, residential
Duparquet	46	Fishing, holiday resorts, residential
Malartic	76	Fishing, holiday resorts
Blouin	14	Fishing, holiday resorts, residential development
Lemoyne	29	Holiday resorts, residential development
Mégiscane**	41	Hydro-Québec project, commercial holiday resorts, fishing
Dufault	21	Drinking water, fishing, residential development

* Hydropower reservoir

** Hydroelectrical potential

Source: MDDEP, 1998

Table 3. Main watercourses in the Abitibi-Témiscamingue region

River	Average flow (m^3/s)	Maximum flow (m^3/s)	Minimum flow (m^3/s)	Years observed (number)	Period measured
Mégiscane	392	2 200	58.6	34	1962-1996
Harricana	59	337	7.7	63	1933-1996
Des Outaouais (sup.)	39	452	7.8	31	1965-1996
Maganasipi	9.2	140	0.19	26	1970-1996

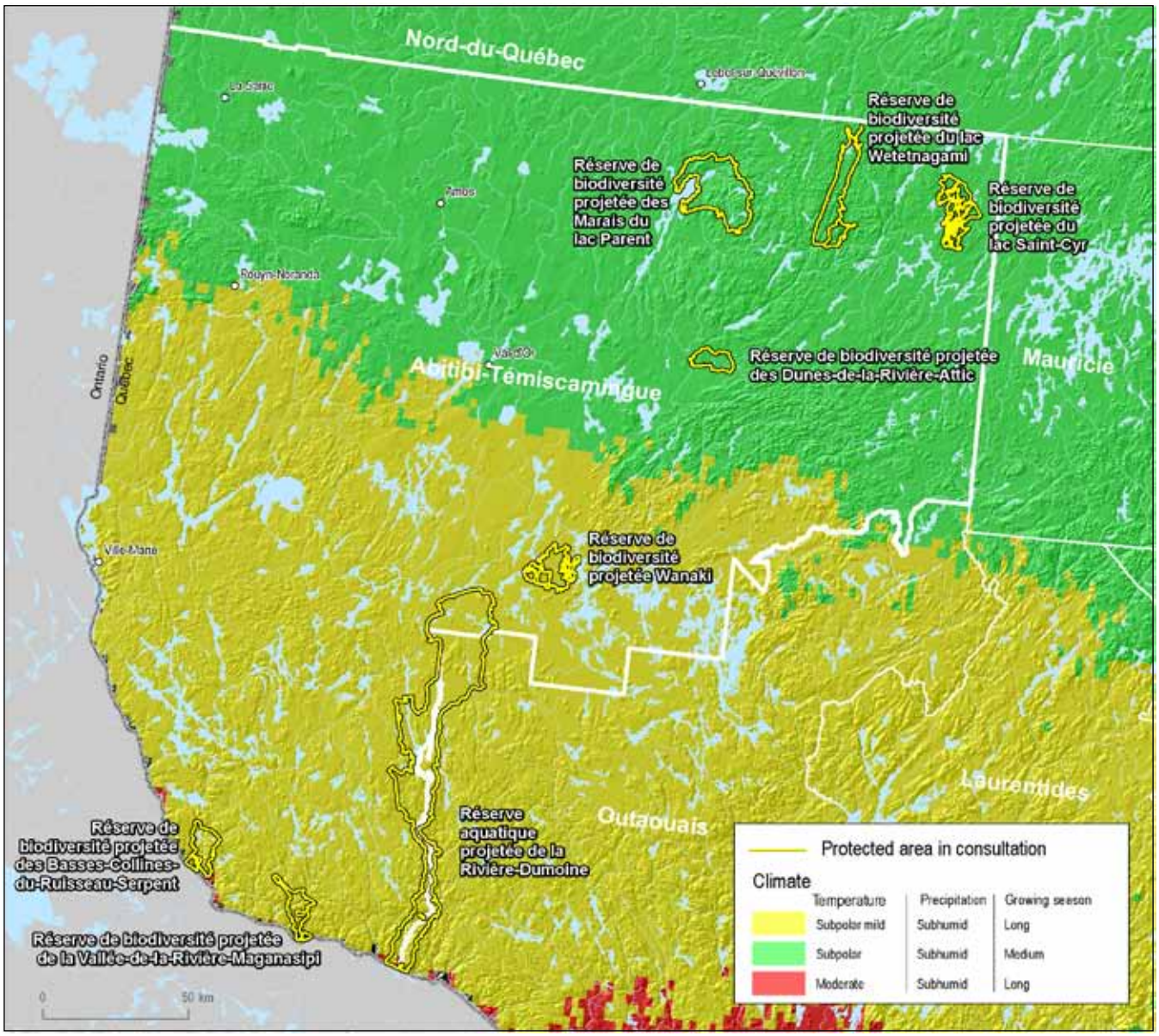
Source: MDDEP, 1999

Climate

The Abitibi-Témiscamingue region has two distinct climatic regions that are divided between the north and south by a demarcation in the vicinity of Rouyn-Noranda and Val-d'Or (Figure 8). The northern portion has a subpolar, subhumid climate with a medium growing season. More specifically, the northern portion of the Abitibi region has an average annual temperature of 0.13°C. The average temperature during the three hottest months ranges from 13.2°C to 15.9°C, and the average temperature during the three coldest months varies between 18.5°C and 13.7°C. Total annual rainfall ranges from 835 mm to 1 145 mm. The average growing season varies between 153 and 177 days. The four proposed protected areas located in Senneterre are affected by this climate.

The vast territory located south of the Rouyn-Noranda–Val-d'Or axis has a mild subpolar, subhumid climate with a long growing season. More specifically, the territory has an average annual temperature of 2.19°C. The average temperature during the three hottest months ranges from 14.7°C to 17.5°C, and the average temperature during the three coldest months varies between 16.0°C and 10.3°C. Total annual rainfall ranges from 797 mm to 1 253 mm. The average growing season varies between 167 and 197 days. The four proposed protected areas located farther south are affected by this climate. On random sites near the Ottawa River, it is possible to find environments affected by a moderate subhumid climate with a long growing season.

Figure 8. Climate classification – Abitibi-Témiscamingue region



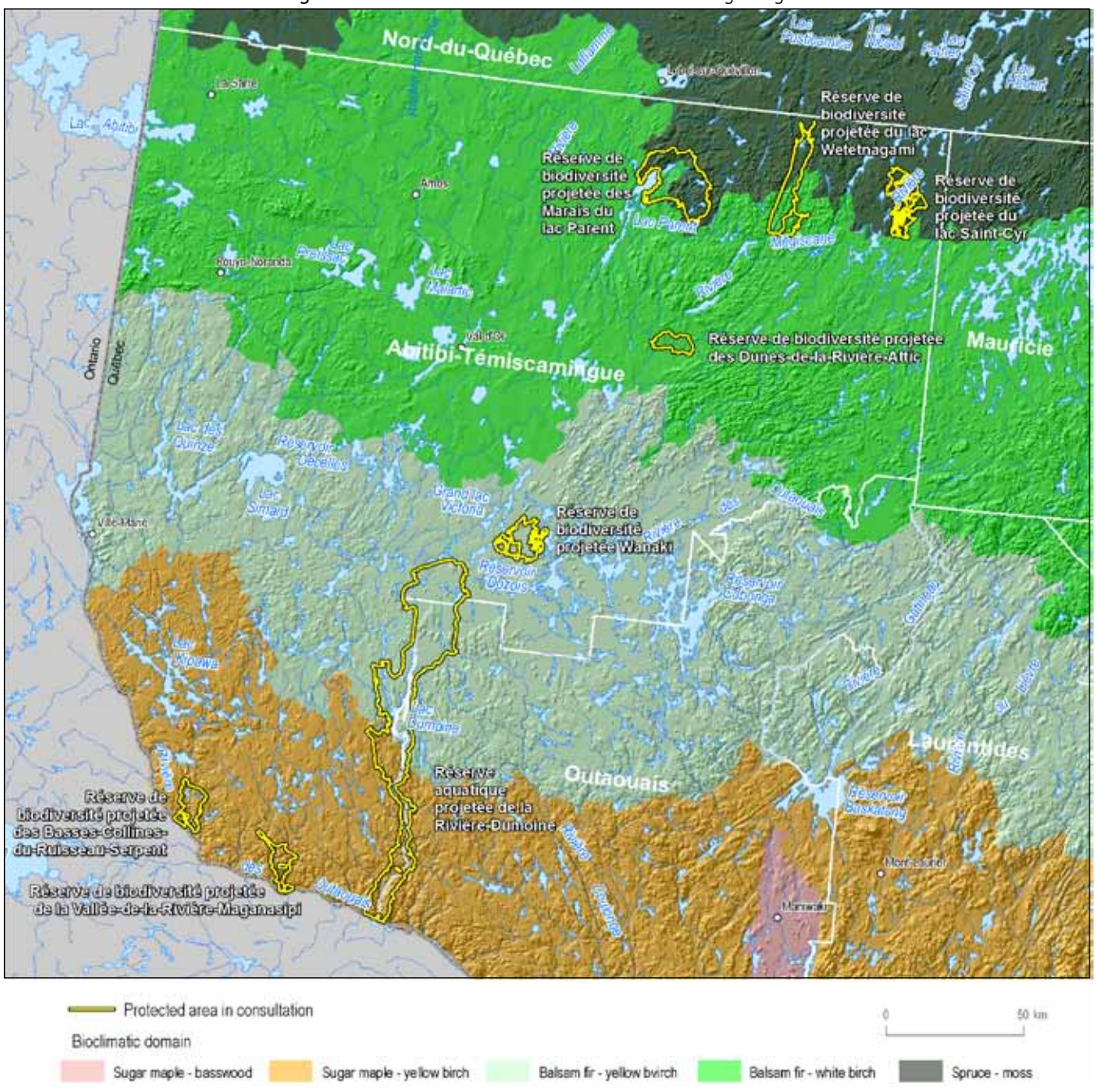
3.2.2 Biological environment

Flora

The demarcation line between the two climatic zones that affect the Abitibi-Témiscamingue region corresponds roughly to the separation between the two bioclimatic domains, i.e. the balsam fir-white birch climatic domain to the north and the balsam fir-yellow birch climatic domain to the south (Figure 9). However, north of Senneterre lies the spruce-moss bioclimatic domain, while the sugar maple-yellow birch bioclimatic domain covers the territory south of the Ville-Marie–Lac Dumoine axis.

In the southern portion of the Témiscamingue region, sugar maple-yellow birch stands and even, occasionally, sugar maple-northern red oak stands are found. The forests then migrate to yellow birch stands moving northward. The climate there is part of the western sub-domain and is fairly dry. This regime favours fires and the communities linked to this natural disturbance, in particular red oak stands, white pine stands and large-toothed aspen stands (*Manuel de foresterie*, 1996). Large-toothed aspen stands are not found in the Abitibi-Témiscamingue region because it is located too far north.

Figure 9. Bioclimatic domains in the Abitibi-Témiscamingue region



Linden trees and beech trees sometimes accompany maple and yellow birch stands while the rare fir forests contain Eastern white cedar or black ash, depending on the type of environment (drier for the Eastern white cedar and wetter for the black ash). On well drained sites, fir trees are also accompanied by red spruce, while sandy sites are populated instead by black spruce stands. Poorly drained hydric sites host balsam fir-red spruce-sphagnum moss stands or sugar maple-yellow birch-black ash stands, occasionally accompanied by linden trees. In the presence of organic deposits (peat bogs), black spruce stands predominate, whether accompanied by sphagnum moss or heaths. At certain specific locations in the minerotrophic peatlands, cedar-fir stands are found, while shorelines, marshes or swamps host black ash, accompanied by American elm. Tamarack can be found in all types of poorly drained environments.

White pine stands are widespread along a 15-km to 20-km-wide strip on the north shore of the Ottawa River, from the mouth of the Rivière Dumoine to west of Lac Kipawa (Figure 10). The pine forests occupy, in particular, steeply sloping sites and with very thin or even non-existent deposits, such as rock outcrops. An especially high concentration of pine forests is found west of Lac Kipawa. Hemlock-yellow birch stands occupy certain specific sites in the vicinity of Lac Marin, Lac Beauchêne and Lac Kipawa. The cedar stands occupy small areas here and there but a few concentrations of the forest stands are found west of the Rivière Dumoine near Lac du Fils, Lac du Pin Blanc and Lac Malouin, and in the vicinity of Lac Kipawa. Starting in Lac Kipawa, sugar maple and yellow birch stands give way to trembling aspen and white birch stands. Moreover, the two species more quickly occupy areas disturbed by fires or human activity. The northern portion of the bioclimatic domain has apparently been subject in recent decades to more frequent logging since forest fires alone cannot explain the high proportion of intolerant hardwoods.

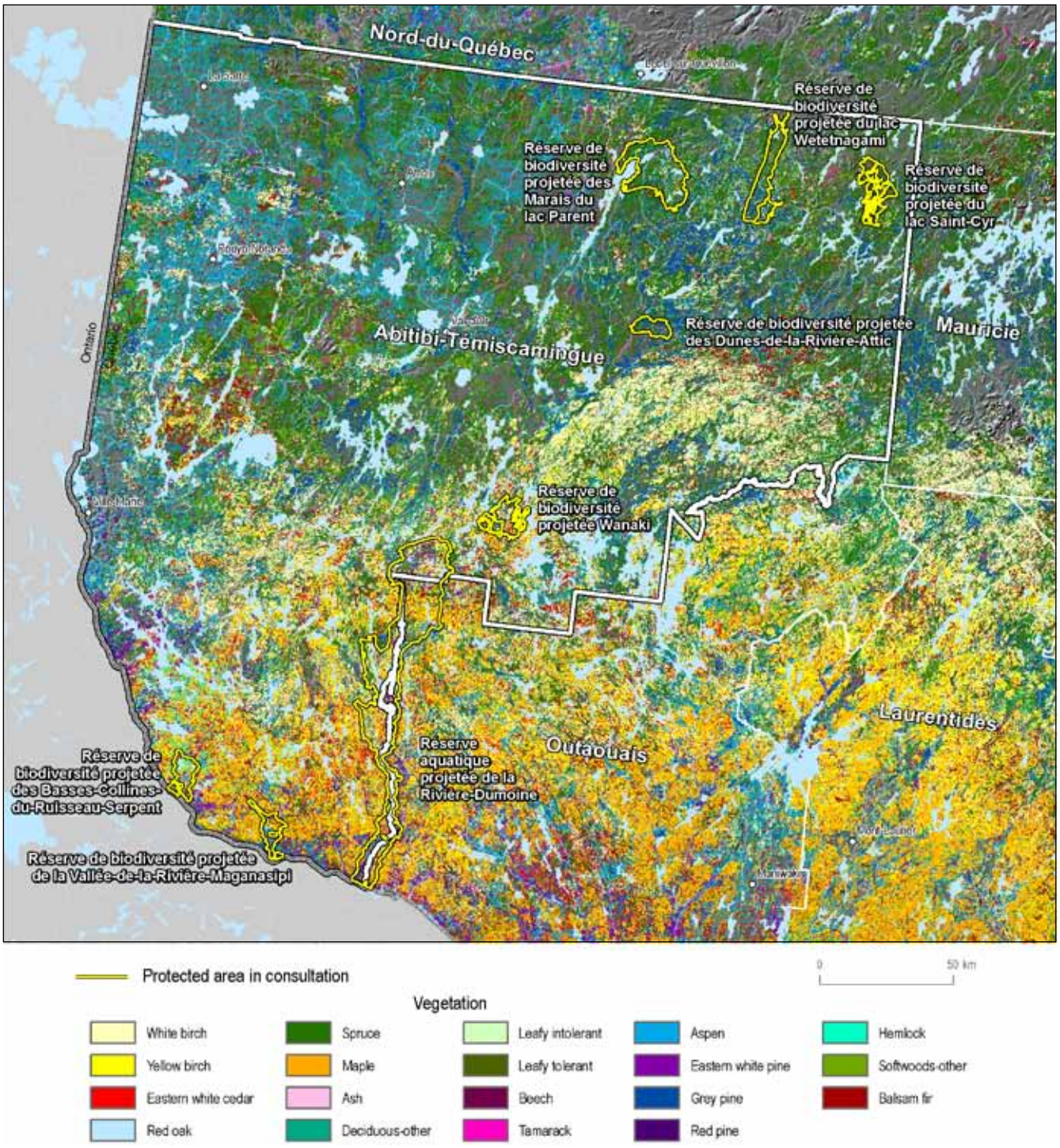
In the balsam fir-yellow birch domain, fir trees and yellow birch give way to trembling aspen and white birch, which are intolerant hardwoods. It goes without saying that the two species are present in such considerable numbers because of decades-long human intervention. The spruce budworm and fires cannot explain the scarcity of yellow birch and balsam fir trees. The impact of spruce budworm epidemics on fir trees in the yellow birch-fir stands should have favoured the yellow birch. Even-aged forests in which fir trees predominate are perpetuated mainly by spruce budworm epidemics. The extensive salvage logging carried out in the 1980s following the spruce budworm epidemics combined with forest fires mean that mature balsam fir-yellow birch stands are extremely rare (*Manuel de foresterie, 1996*).

The fir forests are located mainly north of Lac Simard (Figure 10). Depending on the type of site (mesic, xeric or hydric) and the type of landforms and surface deposits, the plant communities theoretically occupying different environments are closely related to those found in sugar maple-yellow birch stands. However, yellow birch stands usually replace maple forests on mesic sites. Sugar maple-ironwood, sugar maple-beech or sugar maple-yellow birch stands are still present but to a limited extent at the tops of slopes and on summits. The yellow birch stands are mainly concentrated near Lac Dumoine (Figure 10), i.e. in the southernmost portion of the Témiscamingue bioclimatic domain. Major glaciofluvial complexes are found in this sector (Figure 6). Sugar maple-yellow birch stands, above all, are also found in the sector.

At the easternmost point of the Abitibi-Témiscamingue portion of the bioclimatic domain, an arrangement of glaciofluvial deposits and peat bogs is found in one area (Figure 6). The sector hosts several jack pine communities and black spruce stands. The remainder of the territory of the bioclimatic domain located east of Lac Simard is mainly made up of glacial deposits (till). White birch is especially abundant and its dominance grows toward the east. Black spruce stands vie with white birch on several sites. Lastly, the entire western portion, i.e. from Lac Simard, is mostly made up of glaciolacustrine environments of clay and silt dotted with till hummocks or depressions with organic deposits (Figure 6). The clay plains have limited forest cover since they have been colonized by farmland where trembling aspen usually occupies the few forested areas. However, to the east of Lac des Quinze, there is a concentration of yellow birch stands and maple forests as well as several fir forests (Figure 10). Jack pine populates several well drained sites where rock outcrops. Black spruce stands occupy, in particular, the area northeast of Lac Simard (Figure 10).

Farther north, the balsam fir-white birch domain (western sub-domain) can divided into two parts along a north-south axis that more or less runs along the Rivière Bell. Generally speaking, black spruce is abundant there, while fir trees are virtually absent (Figure 10). Fir trees should naturally occupy most of the territory but have now been replaced by poplars and white birch, a reflection of past logging. The western sub-domain has essentially been shaped by fires, insect outbreaks and windthrow. The part located west of the Rivière Bell is made up primarily of clay plains dotted with big peat bogs (Figure 6). Black spruce stands, aspen forests and white birch stands are the predominant forests (Figure 10). It is worth noting that jack pine forests are still found on major sandy soil sites such as the Harricana moraine or the glaciofluvial complexes that created the eskers. In the western portion, where extensive forest land has been replaced by farmland, poplar stands predominate in several wooded areas. The eastern portion mainly comprises more uneven terrain made up of till with glaciofluvial complexes in the valleys and peat bogs in the depressions (Figure 6). White birch stands, black

Figure 10. General tree species group – Abitibi-Témiscamingue region



spruce stands and a number of fir forests found in the rest of the sector largely predominate in the southeastern portion (Figure 10). Pine forests occupy certain sandy sites.

Black spruce-moss stands occupy a small area in the region. It is limited to the south by an axis running roughly from north of Lac Mégiscane to south of Lac Parent, but remains east of Lac Parent. The territory, extensively disturbed by logging in recent decades, in which black spruce stands and fir forests should predominate, still hosts a number of small black spruce stands and certain jack pine stands. It mainly comprises glaciofluvial silt, sand and gravel hummocks in the valleys and numerous environments with organic deposits (Figure 6). However, a number of usually flat areas have rather coarse glaciolacustrine deposits (sand). Depending on the sites and, if they have not been harvested, black spruce stands, black spruce-moss stands, black spruce-heath stands, black spruce-sphagnum moss stands or black spruce-lichen stands occasionally accompanied by a few fir forests here and there or, on poorly drained sites, a number of larch stands, are found (Figure 10).

In the black spruce-moss, balsam fir-white birch and balsam fir-yellow birch bioclimatic domains, the forest stands are usually young (under 40 years of age) or middle-aged (between 40 and 80 years) (Figure 11). However, in the sugar maple-yellow birch stand domain, most of the forest stands are mature. To the west of the Réserve aquatique projetée de la rivière Dumoine, the balsam fir-yellow birch bioclimatic domain also has a concentration of mature forests.

The table 4 clearly illustrates the breakdown of various age class groups of forest stands for the administrative region in each of the bioclimatic domains in the Abitibi-Témiscamingue region and in the region's network of protected areas.

The table 5, which corresponds to Figure 11, reveals that the average of mature forest stands in the protected areas is higher than in the administrative region.

Figure 11. Forest stand age class groups – Abitibi-Témiscamingue region

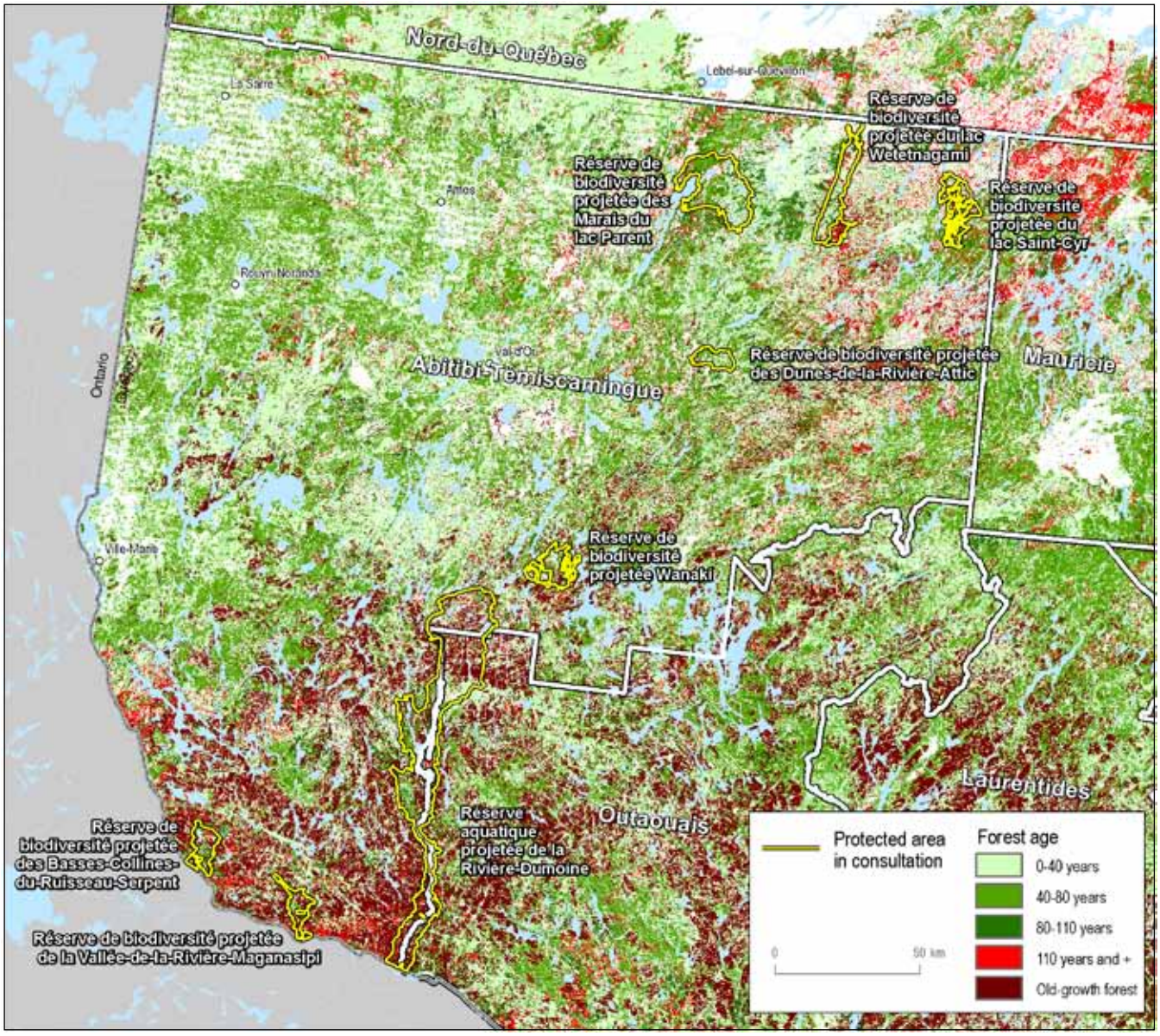


Table 4. Breakdown of age class groups of forest stands

Age class group (%)	Region 08 (%)	Black spruce- moss stand (%)	Sapinière à bouleau blanc (%)	Balsam fir-white birch stands (%)	Balsam fir-yellow birch stands (%)	Protected areas (%)
Less than 40 years	36.3	35.7	39.6	37.5	23.3	27.0
Between 40 and 80 years	35.2	29.7	41.2	34.2	19.7	30.3
Between 80 and 110 years	7.0	18.1	6.5	5.5	7.7	10.8
110 years or over	5.2	13.5	5.2	2.3	8.5	8.8
SIEF* old-growth forests	16.3	3.0	7.6	20.5	40.9	23.2

* SIEF: As indicated in the MRNF's ecoforestry mapping. The data are drawn from the 4th decadal. The proportions may, therefore, have been evaluated since the date the data was captured and compiled.

Old-growth forests, determined according to the age of forest stands and that vary according to the forest tree species,[5] are mainly concentrated in the southern part of the region in the Témiscamingue region (Figure 12).

The following table indicates the breakdown of old-growth forests for the administrative region in each of the bioclimatic domains in the Abitibi-Témiscamingue region and in the region's network of protected areas.

[5] See Appendix 1 for more detailed information.

Figure 12. Location of old-growth forests in the Abitibi-Témiscamingue region

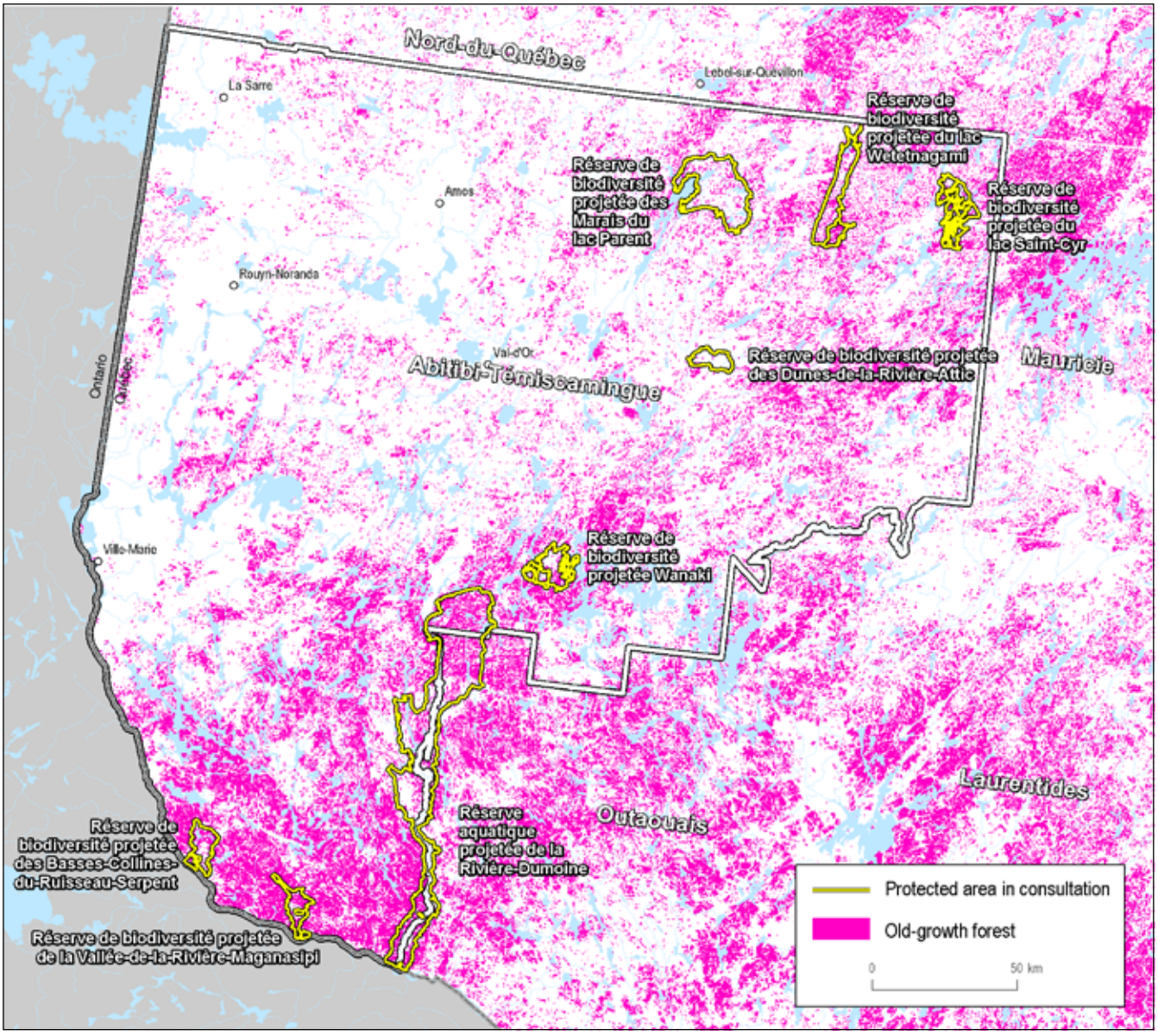


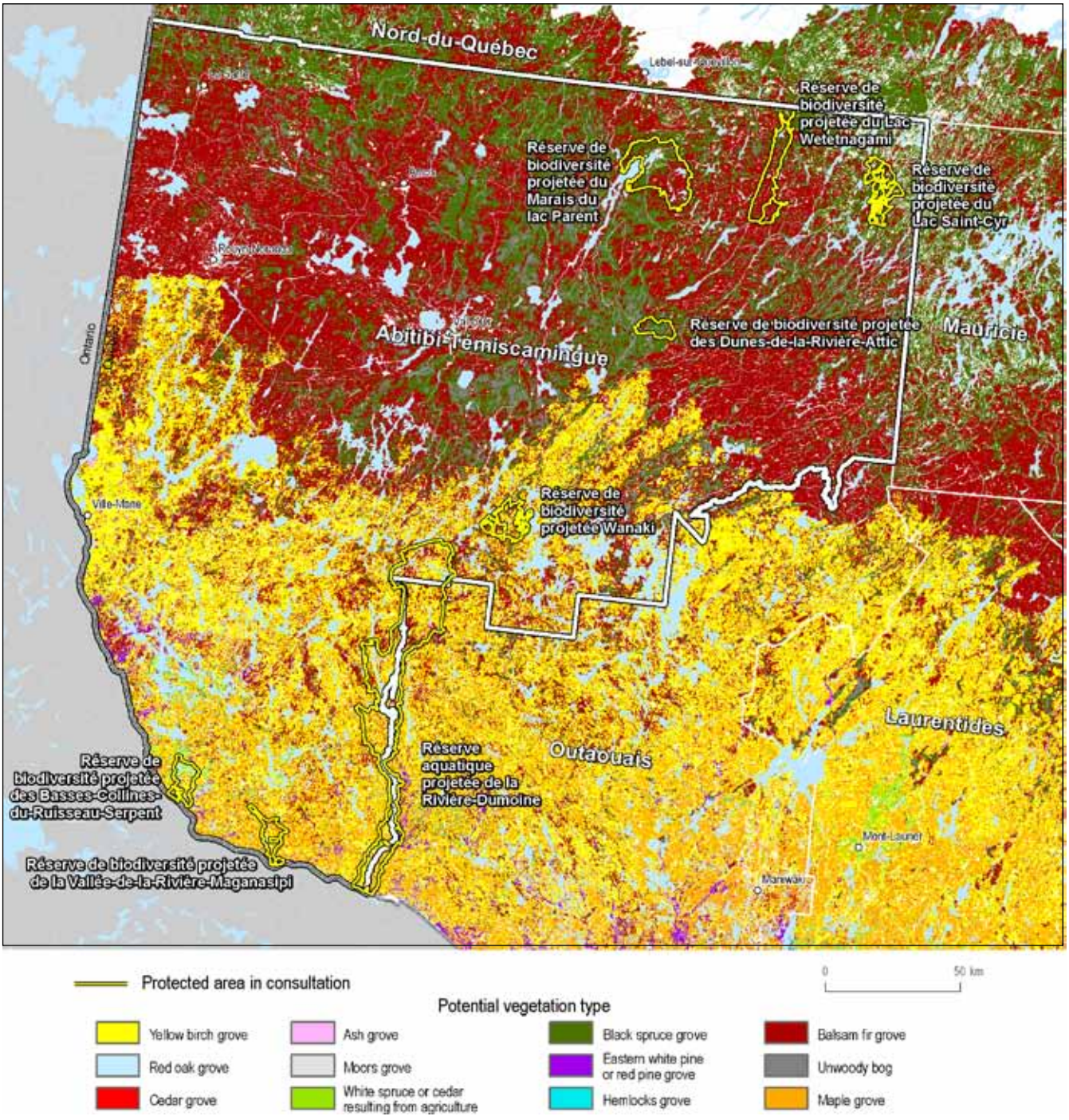
Tableau 5. Breakdown of old-growth forests

Age class group (%)	Region 08 (%)	Black spruce-moss stand (%)	Balsam fir-white birch stands (%)	Balsam fir-yellow birch stands (%)	Sugar maple-yellow birch tands%)	Protected areas (%)
Old-growth forests	26.1	36.2	16.1	27.7	52.6	37.5
Other forests	73.9	63.8	83.9	72.3	47.4	62.5

Table 5 shows that the proportion of old-growth forests in the regional network of protected areas is higher than in the administrative region.

A comparison of current woody vegetation (Figure 10) with potential vegetation, i.e. the vegetation ultimately anticipated in the absence of disturbances (Figure 13), reveals a transformation of the forest cover in most of the Abitibi-Témiscamingue territory. Only the southern part of the Témiscamingue region south of Lac Kipawa appears to be fairly representative of the potential vegetation that should be found in these types of ecosystems. Forest land in the Abitibi-Témiscamingue region covers roughly 70% of the region. It mainly comprises mixed-wood forests (55%), while coniferous forests cover over one-quarter of forest land (27%) and deciduous forests the remainder, i.e. roughly 17%.

Figure 13. Types of potential vegetation – Abitibi-Témiscamingue region



From an ecological standpoint, wetlands are ecosystems with very high biological productivity and considerable floristic and faunal diversity. The Abitibi-Témiscamingue region has two types of peat bogs, ombrotrophic peatlands and minerotrophic peatlands. Ombrotrophic peatlands, whose soil is relatively poor, are fed solely by rainwater and are colonized by low-growing shrubs and black spruce but are often dominated by heaths and herbaceous species associated with such environments. Minerotrophic peatlands are enriched by watercourses or mineral substrates. They are more productive than ombrotrophic peatlands and sustain varied, abundant fauna and flora (MRNF, 2007).

Some 4 027 km^2 of wetlands, equivalent to 6.3% of its territory, cover the Abitibi-Témiscamingue region (Figure 14). Two-thirds of the wetlands are found in the Abitibi portion of the Abitibi and James Bay Lowlands natural province, more precisely in the drainage basins of the Rivière Nottaway, the Ottawa River and the Rivière Harricana. The Abitibi Lowlands abound in peat bogs. Their abundance stems, above all, from the undulations in the topography and the impermeability of glaciolacustrine sediments (Couillard and Grondin, 1986). The lowlands also abound in big marshes that have clay bottoms (Ducks Unlimited, 2009).

The MRC de La Vallée-de-la-Gatineau accounts for just over half (53%) of wetlands in the region. The Lac Parent marshes are among the biggest marshes in the region. Most of the peat bogs in the Abitibi-Témiscamingue region, in particular 85% of those in the Abitibi Lowlands (Jurdant and Gilbert, 1979) and the biggest ones, are ombrotrophic peatlands (bogs). The bogs are usually uniformly wooded, shrubby and herbaceous (Couillard and Grondin, 1986). Minerotrophic peatlands (fens) are mainly structured and bordered by uniform herbaceous or wooded fens and by uniform bogs (Grondin and Ouzilleau, 1980). The fens have numerous very narrow strips and their structure appears to stem from rending of the peat in the wake of sliding on clay (Couillard and Grondin, 1986). The scattering of Eastern white cedar on the strips of the structured fens is a distinctive feature of the Abitibi Lowlands (Couillard and Grondin, 1986). According to the Landsat image classification, the biggest wetlands are located west of Lac Parent and south and east of Lac Sabourin. Big peat bogs are also found in the confluence of the Rivière Attic and the Rivière Mégiscane. The regional mapping of wetlands conducted by Ducks Unlimited highlights the presence of significant concentrations of wetlands near Barraute and Lac Sabourin, southeast of Senneterre and in the vicinity of Lac Mégiscane.

Herbaceous and woody plants, horsetails, club moss, ferns, moss and lichens are abundant and a list of these species is not provided in this information document. Moreover, no specific floristic compilation of the Abitibi-Témiscamingue region exists in the scientific documentation. Baldwin (1958) studied the vascular flora of the clay belt in the Abitibi region and Northeastern Ontario. Only the Réserve de biodiversité projetée des Dunes-de-la-Rivière-Attic and the western half of the Réserve de biodiversité projetée des marais du lac Parent border on the perimeter of the clay belt, which is characterized primarily by boreal flora.

Several compilations produced in the wake of Baldwin's study reveal that the region's vascular flora comprises roughly 1 000 species. The total is undoubtedly higher since the southern part of the region (MRC de Témiscamingue and MRC de La Vallée-de-l'Or) hosts flora that is typical of sugar maple-yellow birch stands that has not been considered in recent floristic estimates. Furthermore, the study of introduced species or of wetlands in the regions would add numerous other taxons to the regional flora (Jean Gagnon, MDDEP, personal communication, 2006).

As for invascular flora, the literature cites 125 species of lichens, 30 species of liverwort, and 159 species of moss. These figures fall well below the probable number of species, which is undoubtedly three times higher in the case of lichens and liverworts and twice as high in the case of mosses, when the number of species is compared with the number in other regions of Québec (Jean Gagnon, MDDEP, personal communication, 2006).

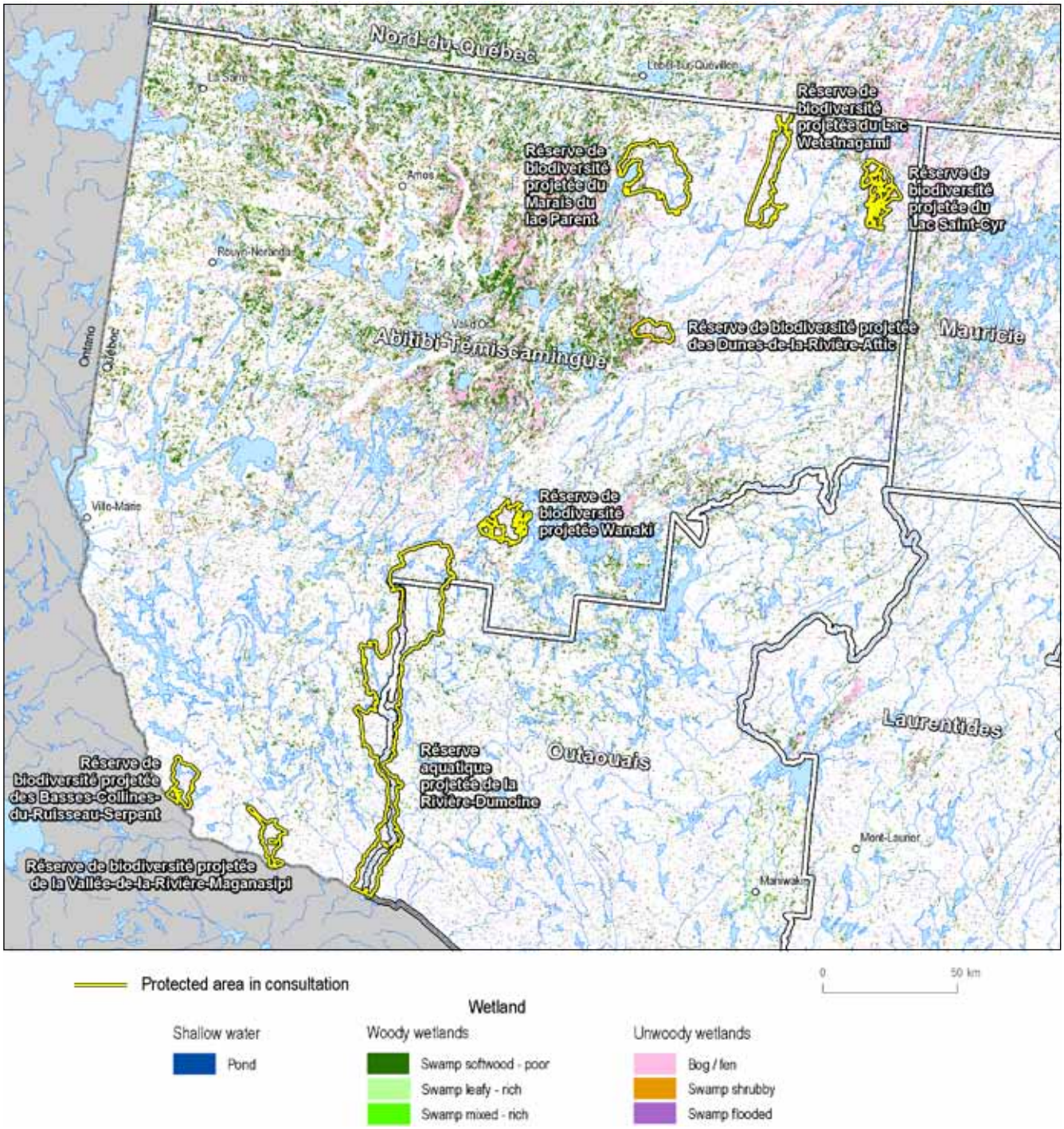
As was true of vascular plants, floristic studies and inventories were conducted mainly in the Abitibi region. No estimate has been made of mushrooms or algae in the region.

Data from the Centre de données sur le patrimoine écologique du Québec (CDPNQ) indicate 146 occurrences concerning 37 plant species that appear to be threatened, vulnerable or likely to be designated as threatened or vulnerable. According to the CDPNQ, no threatened or vulnerable plant species or species likely to be designated as threatened or vulnerable has been identified in the eight proposed protected areas. However, there presence is possible.

Wildlife

Because of the numerous water bodies and watercourses and their varied characteristics (clay plains, peat bogs, groups of low hills, and so on), the Abitibi-Témiscamingue region has highly diversified, productive aquatic habitats. The region's lakes range from shallow with high turbidity because of the presence of clay to deeper lakes at the foot of low hills or between silt hummocks and till hillocks with clear water and more rapid flows. A wide range of habitats and

Figure 14. Wetlands in the Abitibi-Témiscamingue region



ecosystems is available to aquatic fauna. Roughly 48 fish species are found in lakes and rivers in the Abitibi-Témiscamingue region. The feature species are yellow walleye, Northern pike, small-mouthed bass, lake trout, and brook trout. Table 6 lists the fish species found in the Abitibi-Témiscamingue region (MRNF, 2006).

Terrestrial fauna populates environments in the Abitibi-Témiscamingue region such as forests, wildland, agricultural zones and urban and periurban sectors. Public forest environments are the most extensive as they account for nearly 80% of the regional land territory.

Table 6.
Fish in the Abitibi-Témiscamingue region

Small-mouthed bass	Sauger	Lake chub	Brook trout
Brown catfish	Brook stickleback	Emerald shiner	Trout-perch
Spoonhead sculpin	Ninespine stickleback	Golden shiner	Fallfish
Mottled sculpin	Yellow sturgeon*	Mimic shiner	Yellow perch
Slimy sculpin	Logperch	White sucker	Spottail shiner
Silver redhorse	Northern pike	Red sucker	Johnny darter
Shorthead redhorse	Lake whitefish	Splake	Bluntnose minnow
Lake cisco*	Mooneye	Creek chub	Lake trout
Rock bass	Goldeye	Pearl dace	Rainbow trout
Pumpkinseed	Burbot	Blacknose shiner	Brown trout
Iowa darter	Freshwater drum	Long-nose dace	Finescale dace
Yellow walleye	Red-fin shiner	Naskapi	Northern redbelly dace

* Species likely to be designated as threatened or vulnerable

Table 7.
Herpetofauna in the Abitibi-Témiscamingue region

Urodeles (salamanders and newts)		
Mudpuppy	Blue-spotted salamander	Eastern redback salamander
Northern two-lined salamander	Yellow-spotted salamander	Eastern newt
Anura (frogs and toads)		
American toad	Mink frog	American bullfrog
Wood frog	Northern leopard frog	Northern spring peeper
Pickerel frog*	Green frog	
Turtles		
Common snapping turtle	Blanding's turtle*	Painted turtle
Wood turtle**		
Snakes		
Grass snake	Garter snake	Smooth green snake
Red-bellied snake		

* Species likely to be designated as threatened or vulnerable ** Vulnerable species

Table 8. Mammals in the Abitibi-Témiscamingue region

Long-tailed weasel	Coyote	Striped skunk	Norway rat
Pygmy weasel*	Red squirrel	Arctic shrew	Racoon
Red-backed vole	Northern flying squirrel	Common shrew	Red fox (silver or cross)
Field vole	Northern short-tailed shrew	Smoky shrew*	House mouse
Rock vole*	Short-tailed weasel	Water shrew	Woodland jumping mouse
Southern bog lemming*	Snowshoe hare	Pygmy shrew*	Meadow jumping mouse
Wolverine***	Wolf	Moose	Deer mouse
Woodland caribou**	River otter	Black bear	Least chipmunk
Beaver	Canada lynx*	Marten	Eastern chipmunk
White-tailed deer	Bobcat	Heather vole	Hairy-tailed mole
Star-nosed mole	Woodchuck	North American porcupine	American mink
Cougar*	American marten	Muskrat	
Silver-haired bat*	Pygmy bat	Northern myotis	Big brown bat
Hoary bat*	Eastern red bat		Small brown bat

* Species likely to be designated as threatened or vulnerable ** Vulnerable species *** Threatened species

Snowshoe hare, black bear, red squirrel, beaver, muskrat, North American porcupine, red fox, American marten, American mink, wolf, otter, Canada lynx, moose, and white-tailed deer are some of the species that are characteristic of balsam fir-yellow birch stands and balsam fir-white birch stands in western Québec. All told, roughly 50 mammal species frequent the territories, including seven bat species (chioptera). Tables 7 and 8 present the herpetofauna and mammals, respectively, found in the Abitibi-Témiscamingue region.

The Abitibi-Témiscamingue region has 135 protected wildlife habitats. The protected areas target, in particular, water birds, bird colonies, herons, white-tailed deer and muskrat. Beaver reserves are also found in the region, although they are not protected areas.

Among the list of 13 species that are threatened or vulnerable or likely to be designated as threatened or vulnerable living in the Abitibi-Témiscamingue region, the wolverine is the only threatened species. Woodland caribou is deemed to be vulnerable. The other species, i.e. the pygmy weasel, the rock vole, the southern lemming, the cougar, the Canada lynx, the bobcat, the smoky shrew, the silver-haired bat, the hoary bat, the eastern red bat, and the ringneck snake appear on the list of species likely to be designated as threatened or vulnerable.

Woodland caribou, an ecotype of woodland caribou, is unquestionably one of the feature species of the Abitibi-Témiscamingue region. The Val-d'Or herd is an isolated herd estimated to number fewer than 30 animals. Its distribution area of roughly 5 000 km^2 is located south of Val-d'Or. The territory that the herd usually frequents roughly runs from Lac Villebon to the Decelles reservoir and from Lac Sabourin to Grand Lac Victoria. The habitats that the herd frequents vary depending on the season. The Réserve de biodiversité des Caribous-de-Val-d'Or protects 434 km^2 of territory located in the distribution area that offer habitats suited to the caribou. Despite the protected area and development plan for the wildlife site for the herd, industrial logging is making habitats suitable for the species increasingly scarce. It should be noted that caribou prefer big peat bogs and spruce-lichen stands and are considerably affected by human disturbance and the loss of quality of their habitats. In addition to modifying habitats, logging promotes certain wildlife species that are important to the hunting-based economy, such as moose. The broader presence of moose benefits wolves and bears, which become significant predators of the caribou. Of the eight territories proposed as biodiversity reserves or aquatic reserves, none is directly associated with big habitats or habitats that the Val-d'Or caribou herd frequents.

The Abitibi-Témiscamingue region also offers varied habitats for avifauna. The bird species observed are characteristic of the fir forests in mixed-wood forests and continuous boreal forests in western Québec. Roughly 232 bird species can be observed in the Abitibi-Témiscamingue region. Appendix 2 lists the avian species.

Avifauna is especially abundant in the Lac Parent marshes, which offer quality habitats for numerous species. Some 568 references to 94 species have been noted in the vicinity of Lac Parent. Of the species, 85 are breeding birds. In particular, the area is an outstanding site for the American black duck.

Nine bird species are designated as threatened or vulnerable. The horned grebe is designated as threatened, and the golden eagle, the peregrine falcon and the bald eagle are designated as vulnerable. Barrow's goldeneye, the short-eared owl, Nelson's sharp-tailed sparrow, the Bicknell's thrush and the yellow rail are likely to be designated as threatened or vulnerable.

CDPNQ data indicate 132 occurrences of 17 wildlife species. Occurrences of the bald eagle are located in the Réserve de biodiversité projetée de la Vallée-de-la-Rivière-Maganasipi and the Réserve aquatique projetée de la Rivière-Dumoine.

3.3 Social profile[6]

3.3.1 Historical overview

Human occupation of the territory of the Abitibi-Témiscamingue region dates from the epoch that followed the melting of the glaciers. Indeed, the first known occupation to date appears to have occurred over 6 000 years ago. Native groupes mainly occupied the territory of the Ottawa River Valley, which abounded in game, fur-bearing animals and fish. They crisscrossed the territory (nitakinan) to ensure their subsistence, centred mainly on hunting, fishing and food-collecting.

Later, numerous Aboriginal nations, including the Algonquin, participated in a vast trade network with the settlers. The network underpinned what became the fur-trading system. In the 17th century, explorers, coureurs de bois and prospectors crisscrossed the Témiscamingue region. The construction of trading posts on the shores of Lac Témiscamingue (1678) and Lac Abitibi (1686) considerably reduced the distances that the Algonquin had to travel to sell or trade their furs, although they did not have to travel far to trap game. At the time, the Ottawa River was one of the busiest trading routes. During this period, Fort Témiscamingue was the hub of the fur trade in northern Québec. The fur trade in the Abitibi-Témiscamingue region and elsewhere in Canada generally flourished during the 17th and 18th centuries. In the early 19th century, the international market declined, which led to a reduction of activity in Canada.

[6] Drawn from M. Riopel, 2003, and O. Vincent *et al.*, 1990

However, at the same time, logging developed rapidly in Canada and in the Abitibi-Témiscamingue region. The Outaouais region witnessed the development of the scantling trade and obtaining supplies of eastern white pine and red pine made it necessary to go to more northern territories by travelling up the Ottawa River. Such trade developed in the Témiscamingue region in the 1870s since demand was so great that the pine forests in the Outaouais region were exhausted. In the early 20th century, roughly 2 000 loggers were working in forests in the Témiscamingue region.

Colonization of the region, which began in the Témiscamingue region in the mid-19th century, spread to the Abitibi region in the early 20th century and followed forestry development. The colonists settled on land decimated by widespread intensive logging, in particular of big eastern white pine, to engage in farming.

The Témiscamingue region was the last region of Québec to be opened up to colonization. The initial phase of colonization began in 1886 with the establishment of Ville-Marie, followed by Guérin and Latulipe in 1914. World War I temporarily slowed down colonization in the Témiscamingue region. Around 1910, the construction by the federal government of the continent-wide railway extended colonization to the Abitibi region with, in 1912, the establishment of Amos and several parishes located along the rail line, to La Sarre.

The 1929 economic crisis led to another wave of colonization in the region, since French Canadians perceived it as a solution. However, the new wave was less spontaneous since it occurred with the assistance of government colonization programs aimed at moving the unemployed from urban centres to the regions. The Abitibi region was mainly colonized under the Gordon (1932-1934) and Vautrin (1934-1936) plans, which led to the establishment of numerous parishes.

Agriculture became the way of life and occupation of most of the colonists, although they engaged in subsistence farming. In the 1910s, certain farmers in the Témiscamingue region found it difficult to sell their produce because customers were moving away and harvestable forests were shifting northward, and they turned to dairy farming.

In the Abitibi region, colonists who settled near the railroad line were entitled to cut all of the wood on their parcel of land. Since the wood was transported on the railroad line, this was a more competitive, lucrative form of trade and agriculture thus developed there more slowly. The opening of mines along the Cadillac Fault accompanied the colonization and ensured long-term occupation of the territory. However, it was only in the 1920s that this industry sector was consolidated through the opening of new mining districts. During the 1930s, growing numbers of new colonists opted for logging camps and work in the mines. Numerous colonists returned to live and work in Montréal during the period of prosperity of World War II. Among those who remained, farmers in the Abitibi and Témiscamingue regions contributed to the cooperative movement and developed the dairy industry.

Hydroelectricity, mining and pulp and paper are industries that also marked the Abitibi-Témiscamingue region, especially the mining sector, which is still flourishing in the Abitibi region. The construction of a series of control dams along the Upper Ottawa River in the late 1910s created numerous jobs and led to the establishment of small communities near certain dams. The construction of the continent-wide railway contributed greatly to the establishment of the sawmill industry. Indeed, at that time, the regional forest sector shifted from timber to pulp and paper. During the 1920s, companies invested in hydroelectric power development on the region's rivers to provide electricity for the mines in Rouyn-Noranda. The power-pools and hydroelectric power plants sustained mining development in the Abitibi region.

Moreover, mining development on the Cadillac Fault starting in the 1920s best represented the Abitibi region's economy and was the key to its development.. In 1922, a gold rush occurred in the territory that became Rouyn-Noranda, where the Noranda mine was built. Gold deposits also extended eastward, especially in the vicinity of Val-d'Or, where substantial amounts of gold were discovered. In the mid-1930s, the mining industry in the Abitibi region was indeed prosperous.

During the 1950s, the regional forest economy became structured. In the late 1960s, government measures promoted the development of the sawtimber industry. Furthermore, sawmills benefited from steady supplies. New sawmills were opened just outside the region, notably in Lebel-sur-Quévillon. However, the industry did not benefit all of the cities and the Canadian International Paper plant in Témiscaming ceased operations but reopened when former managers took over the plant and established Tembec in 1973.

In the mid-20th century, exhausted or no longer profitable mineral deposits sparked mine closings. However, mining operations developed in Chibougamau and Matagami and the construction of major roads and rail lines facilitated their development. A number of workers in the Abitibi-Témiscamingue region migrated to the new cities. In the south (Rouyn-Noranda and Val-d'Or), government measures adopted in the 1980s spurred mining exploration and led to the opening of new gold mines.

This brief overview of the history of the Abitibi-Témiscamingue region shows that the region's development has also been inextricably linked to industrial-scale natural resource development. Even today, the Abitibi-Témiscamingue region's vitality depends, to a large extent, on the strength of markets for raw materials and Québec, Canadian, American and international demand.

3.3.2 The region today

Over the past 40 years, the population of the Abitibi-Témiscamingue region has varied, from just over 142 000 inhabitants in 1971 to a peak of 156 000 inhabitants in 1995. Since then, it has declined and stabilized at roughly 145 000, which is more or less the average population over the past 10 years. The current population density is 2.6 inhabitants per square kilometre (ISQ, 2010). However, the developed areas cover only 155 km^2, equivalent to 0.2% of the region's territory. The population density in the developed areas is 941 inhabitants per square kilometre (ISQ, 2010).

Despite its relative dependency on international demand for raw materials, the Abitibi-Témiscamingue region cannot be confined to the description of a resource region. Indeed, the cultural milieu is extensive and diversified and the rural milieu is more robust and innovative than the average in other regions of Québec. Even today, over one-third of the population of the Abitibi-Témiscamingue region lives in rural areas. The region is benefiting from a rural environment that is being devitalized less rapidly and intensively than the average devitalization observed in Québec as a whole. Furthermore, its vitality is accompanied by a determination to innovate. Accordingly, numerous rural laboratories have been engaged in experimentation since 2007.

As for the region's cultural and artistic milieu, it appears to be expanding. Between 2005 and 2010, the number of artists (visual or media arts, dance, arts and crafts, music, theatre, literature) increased by 24% and the number of cultural organizations rose 19% during the same period. Over one-third of the organizations are located in Rouyn-Noranda. Employment in the cultural sector accounts for 3% of all jobs in the region. The gross domestic product (GDP) of the major information industry and cultural industry sector in the region has grown appreciably since 2003, from $90 million to $133 million in 2007, equivalent to a 10.3% growth rate in five years, more than double the Québec average (4.9%). Over the past decade, the Abitibi-Témiscamingue region has been noteworthy, in particular, for the development of numerous festivals.

The Abitibi-Témiscamingue region, like many other forest regions in Québec, is culturally linked to nature-based recreational or wildlife activities. Whether they take place in wildlife sanctuaries, controlled harvesting zones or outfitting operations, on open public lands or in protected areas, hunting, fishing and various types of hiking are solidly rooted in the lives of the region's residents.

Hunting is particularly prized and the Abitibi-Témiscamingue region accounts for 7% of Québec hunters (MRNF, PDRRF-08, 2002), although its population accounts for barely 2% of the province's total population. This situation is also apparent in the number of basic shelters found there, which account for 55% of all such shelters in Québec (MRNF, 2006). In addition to small game, the most prized species are moose, bear and white-tailed deer.

However, sportfishing is the most widespread form of wildlife harvesting in the Abitibi-Témiscamingue region. There are twice as many fishing days each year as hunting days. The region accounts for 7% of all of the province's fishermen, the same proportion as hunters. They fish mainly in the Témiscamingue and Vallée-de-l'Or regions and prefer open lands to structured wildlife territories. In addition to the regional clientele, the region attracts visitors from elsewhere in Québec, Ontario and abroad. Moreover, lakes such as Lac Opasatica, Lac Preissac, Lac Duparquet, Lac Decelles, Lac Malartic, and so on are located near urban centres and also attract a significant number of fishermen (MRNF, 2006).

In addition, the Abitibi-Témiscamingue region has roughly 1 000 trappers for 514 traplines. However, the figures do not take into account trapping by the Algonquin. The species most prized in the region are beaver, American marten, muskrat, weasel, mink, red fox and Canadian lynx.

Holiday resorts are widespread in the region. In 2004, there were roughly 1 900 vacation lot leases. There are also numerous cabins located on private lots, which have not been counted for the region overall.

3.3.3 The Anishnabeg

The Algonquin (Anishnabeg) appear to have occupied and inhabited western Québec and northeastern Ontario for several centuries. The region concerned is usually defined by the land included in the drainage basin of the Ottawa River.

Before the arrival of the Europeans, a network of trading routes was well established throughout North America by means of rivers, lakes, portages and trails. Huron-Wendat of Georgian Bay traded corn for the meat and furs of hunters groups from Outaouais river. Forest Indian tribes traded with the inhabitants of the plains. Precious shells gathered by coastal tribes such as the Mi'kmaqs travelled far into the interior of the country. Furthermore, the Rivière Gatineau and the Rivière Dumoine enabled the Algonquin to reach the drainage basin of the Rivière Saint-Maurice, which facilitated access to Lac Saint-Jean and Lac Mistassini.

The Algonquin are one of the first groups that Samuel de Champlain met. Through their strategic position and trading partnerships, they played an important role in the 17th century. As the main users of the Ottawa River and through their political and trading alliances with the Aboriginal nations farther north and west, they became leading allies of the French.

Algonquin society is patriarchal. For example, hunting grounds were handed down from father to son and at the time of marriage, the young woman would live with her husband's family. Several families gathered in the summer, in groups of 150 to 300 people, to engage in exchanges, marriage and other common activities, in what were extended families or families that were unrelated. During the summer, they stayed in one place or travelled in the vicinity. They took advantage of the opportunity to gather food for the winter. They dried meat, picked wild berries, grew certain plants, prepared medicinal plants, and so on. The food gathered then allowed the families to travel to their hunting grounds and live there until late November, which marked the beginning of winter. Winter was a period of subsistence and survival.

In the fall, the group divided into small units of not more than 30 people since each family had a hunting ground with an area of roughly 1 000 km^2, which meant that a bigger group could not survive with the available resources. The small groups comprised extended families, i.e. a grandfather, a grandmother, their children, the latters' spouses and grandchildren. With the return of mild weather, the snow melted and ice on watercourses broke up, the cycle resumed and the families set off again for their summer camps.

The Algonquin were a nation of hunters, which meant that mobility was essential. The materials they used had, therefore, to be light and easy to transport. Canoes were made of birch bark, stitched with spruce roots and waterproofed through the application of heated spruce gum and fat. They were easy to move and the material was readily available. During the winter, toboggans were used to transport material and the Algonquin wore snowshoes.

In 1913, American anthropologist Frank Speck made note of the months as the Timiskaming Algonquin explained them to him. The following calendar shows how the seasons were established according to food production.

January	Long moon month
February	Groundhog month
March	Goose month
April	Breaking up of the ice month
May	Flower month
June	Strawberry month
July	Raspberry month
August	Blueberry month
September	Hulling corn (harvest) month
October	Trout month
November	Whitefish monthc
December	Beginning of winter month

Today, seven of the nine Algonquin communities in Québec are located in the Abitibi-Témiscamingue region, with a total population of roughly 6 800. The Algonquin in the Abitibi-Témiscamingue region account for 4% of the region's population and 9% of Québec's overall Aboriginal population.

The seven Algonquin communities in the Abitibi-Témiscamingue region are Kitcisakik (Grand-Lac-Victoria), Lac-Simon, Pikogan (Abitibiwini), Timiskaming, Winneway (Long Point), Eagle Village (Kipawa) and Hunter's Point (Wolf Lake). Two political structures now represent the Algonquins' interests, i.e. the Algonquin Anishinabeg Nation Tribal Council and the Algonquin Nation Secretariat. In 2007, roughly 56% of the Algonquin in these communities were living on reserves or settlements and 44% were living outside them (Indian and Northern Affairs Canada, 2007). Other Aboriginal nations such as the Cree and the Attikamek frequent part of the territory of the Abitibi-Témiscamingue region.

3.4 Economic profile

The regional economy hinges, by and large, on the development and, to a lesser extent, the processing of natural resources. Mining, forests and agriculture are the major industries in the region. According to data for 2009 from the Institut de la statistique du Québec (ISQ), goods-producing industries accounted for 46.4% ($2.6 million) of regional GDP totalling $5.6 million, compared with 53.6% ($3.0 million) for services-producing industries.

The breakdown of goods-producing industries in regional GDP reveals that the mining industry is by far the most important one (roughly 39%). All categories of product manufacturing account for 19% of GDP and the sector comprising agriculture, forestry, hunting and fishing accounts for 7.4% of GDP.

In 2010, roughly 49 800 of the 68 200 jobs in the region (73%) were in the service sector and 18 400 jobs (27%), in the goods sector. The service sector, which has grown over the past decade, seems poised to pursue growth in the coming years. Moreover, the construction sector is developing because of major mining and infrastructure projects and hydroelectric development projects in the James Bay region.

3.4.1 Economic activity

Forestry

Forests in the Abitibi-Témiscamingue region cover over 45 000 km^2, equivalent to 70% of the region's territory overall. As is the case elsewhere in Québec, the capacity of forest resource processing plants exceeds the supplies available.

There are now nearly 300 forestry companies operating in the Abitibi-Témiscamingue region. The forestry crisis caused a significant reduction in the number of wood processing plants, from 41 in 2006 to 31 in 2011. According to Statistics Canada, the logging industry directly employed 5 900 workers in 2010, equivalent to nearly 9% of the regional labour force.

The value of capital assets in the logging industry in the region stood at $24.5 million in 2008. This figure has fallen in recent years, to $21.0 million in 2009 and to $19.4 million in 2010. Specifically, in the wood products manufacturing sector, expenditures have declined since 2005 ($63.1 million), to $11.9 million in 2008 (Observatoire de l'Abitibi-Témiscamingue, 2011).

Mining

Some $1.1 billion was invested in the mining sector in 2010, which ranks the Abitibi-Témiscamingue region as Québec's leading mining region by far, since it alone accounts for 45% of all mining investments in the province. In 2010, there were 186 exploration projects in the region, equivalent to 40% of all such projects in Québec. Gold is the main mineral ore mined. The region also offers sound potential for copper, silver and zinc. Furthermore, exploration for rare earth metals has grown in the Témiscamingue region.

In early 2011, the region's mining industry centred on the operation of nine mining complexes: La Ronde, Kiena, Beaufor, Goldex, Lac Herbin, Mouska, Lapa, Lamaque and Barry. Among the mining projects in the development stage, mention should be made of Canadian Malartic, Westwood, La Ronde II, Joanna, Malartic-Midway, Lac Pelletier, Rocmec 1, Francoeur, Québec Lithium and Dumont Nickel (Observatoire de l'Abitibi-Témiscamingue, 2011).

In the Abitibi-Témiscamingue region, 5 700 workers, equivalent to 8% of the overall workforce, are engaged in industries related to exploration, mining and primary metal manufacturing. The region alone accounts for 39% of mining exploration and mining jobs in Québec (Observatoire de l'Abitibi-Témiscamingue, 2011).

Agriculture

In the Abitibi-Témiscamingue region, roughly 700 farms were in operation in 2010, equivalent to approximately of 2% of farms in Québec. The farms employed some 2 000 individuals and nearly 2 700 people when seasonal, family or hired workers are included. The bio-food sector accounts for 9 400 jobs in the region, equivalent to 14% of the regional labour force. The net income of farmers has fallen steadily in recent years, to not more than $2.9 million in 2009, according to provisional estimates. As for capital expenditures (crops and livestock), they reached $20.6 million in 2007 and were estimated at approximately $4.3 million in 2009 (Observatoire de l'Abitibi-Témiscamingue, 2008).

Stock production accounted for roughly 80% of farming enterprises, i.e. cattle (43%), dairy cows (26%) and sheep (7%), in addition to marginal production such as cervids, wild boars, bison, ratites and grass-fed beef. The land is cultivated mainly to feed cattle and fodder accounts for a high proportion of the area cultivated. To a lesser extent, barley and oats are the most extensively planted cereal grains. Moreover, the region is noted for its beef production (milk-fed calves) and sheep production and the quality of its fodder. It should be noted that agricultural enterprises cover only 3% of the regional territory while roughly 10% is subject to agricultural zoning (MRNF, 2006).

The legacy of clayey earth left by the retreat of the Barlow-Ojibway proglacial lake now represents one of the biggest reserves of unfarmed arable land in North America (MRNF, 2006).

Wildlife activities and recreational tourism

The importance to residents of the Abitibi-Témiscamingue region of wildlife activities and recreational tourism is apparent in the figure that indicates that 71.% of regional economic spinoff from the industry is generated by residents. A survey conducted in 2000 on wildlife- and nature-related activities revealed that the Abitibi-Témiscamingue region has 51 713 amateur recreationists, 40 868 fishing enthusiasts and 21 624 hunting enthusiasts who generated $38.0 million, $48.4 million and $37.0, respectively, in economic spinoff.

Since 1999, trappers sell, on average, 31 000 furs each year, which generates average annual economic spinoff of $1 million. Between the 1999-2000 season and the 2004-2005 season, sales of furs ranged from $740 000 to $1.1 million. Beaver, American marten and Canadian lynx are the species that contributed most to the total.

According to Ministère du Tourisme data for 2007, tourism receipts in the Abitibi-Témiscamingue region apparently stood at $87 million. Among the tourist activities that contribute to such income, mention should be made of nature-related, adventure and outdoor activities, events and festivals, visits to outfitting operations ($9.1 million in economic spinoff in 2006), meetings and conventions, and snowmobile and quad bike activities. Snowmobiles engendered $27 million in expenditures during the 2008-2009 season, while quad bikes generated roughly $9 million in economic spinoff during the same period (Observatoire de l'Abitibi-Témiscamingue, 2011).

In 2000, wildlife-related activities, i.e. hunting, fishing and wildlife-related travel such as birdwatching, generated in the Abitibi-Témiscamingue region over $111 million in total expenditures and helped create or maintain 952 jobs with a total payroll of over $12 million..

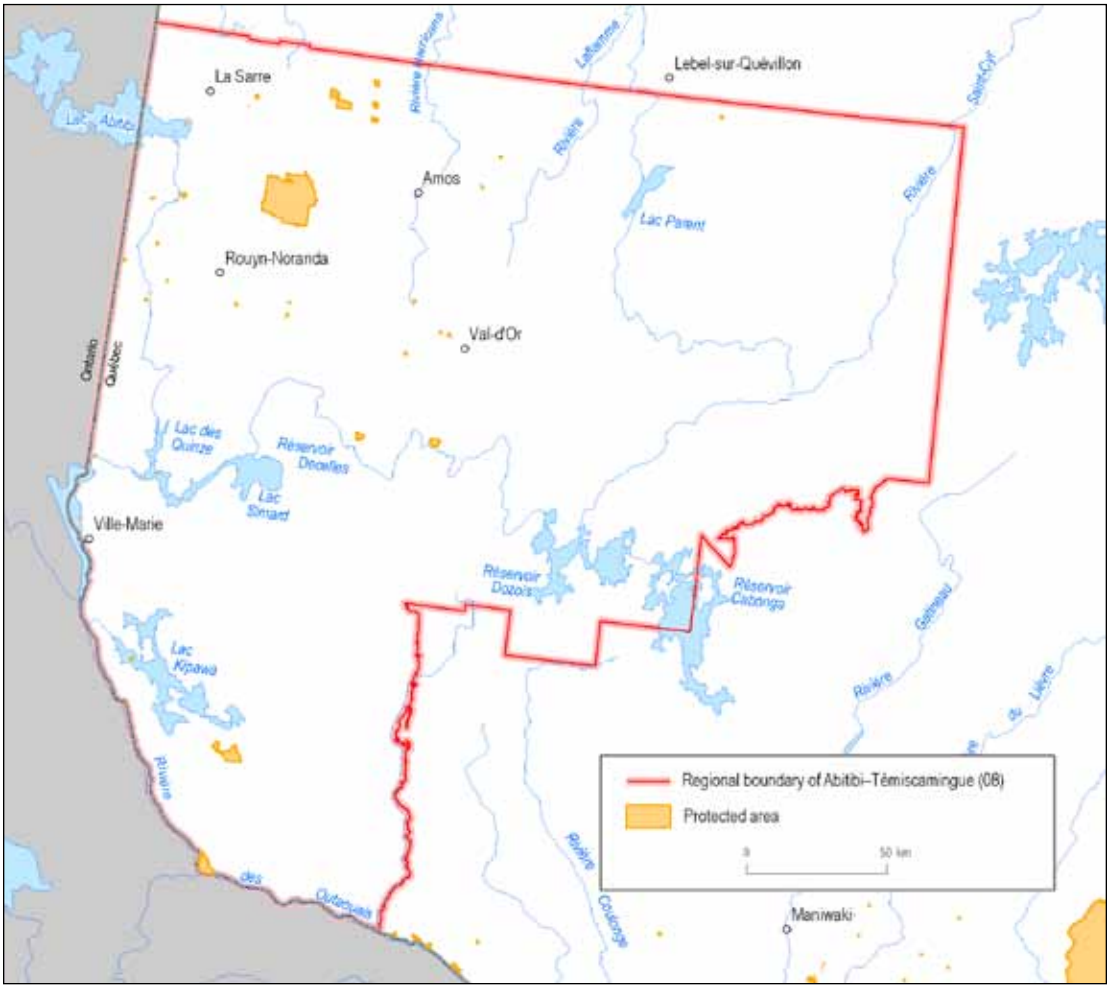
The Abitibi-Témiscamingue region has 11 outfitting operations with exclusive rights, 89 outfitting operations without exclusive rights, one wildlife sanctuary (La Vérendrye) and six controlled harvesting zones (ZECs). The outfitting operations with exclusive rights cover an area of nearly 2 500 km^2 and the ZECs, an area of nearly 8 300 km^2.

3.5 Regional profile of the protected areas

3.5.1 Changes in the network of protected areas between 2002 and 2010

In 2002, the network of protected areas in the Abitibi-Témiscamingue region comprised 45 sites totalling only 368 km^2, equivalent to 0.1% of the geographic area of the administrative region (Figure 15). The network was mainly made up of wildlife

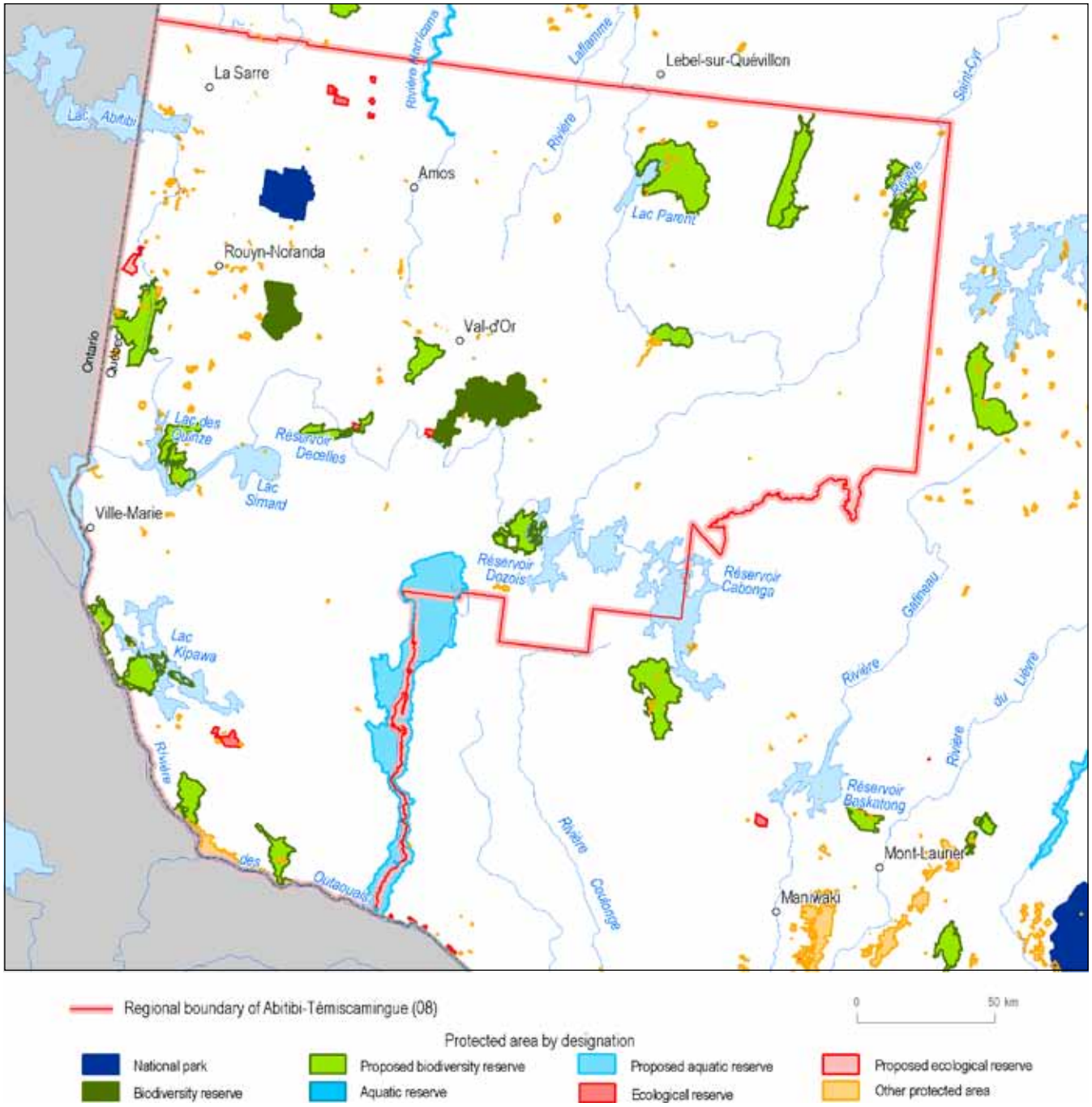
Figure 15. The network of protected areas in the Abitibi-Témiscamingue region prior to 2002



habitats. The biggest protected area in terms of geographic size was the Parc national d'Aiguebelle (262 km^2).

The adoption of the *Natural Heritage Conservation Act* and the implementation of two strategic action plans on protected areas (2002-2005 and 2005-2008) considerably broadened the network of protected areas. During the years in which the action plans were implemented, 33 exceptional forest ecosystems were created as well as two proposed aquatic reserves, 14 proposed biodiversity reserves, one nature reserve on private land, 19 biological refuges, and several wildlife habitats. The establishment of the protected areas increased the total geographic area of protected areas in the Abitibi-Témiscamingue region to over 4 800 km^2, equivalent to 6.34% of the territory's area. Figure 16 presents the cartographic portrait of the network of protected areas in the Abitibi-Témiscamingue region in 2012.

Figure 16. The network of protected areas in the Abitibi-Témiscamingue region in 2012



3.5.2 The current network of protected areas in the Abitibi-Témiscamingue region

The network of protected areas in the Abitibi-Témiscamingue region now mainly comprises aquatic reserves and biodiversity reserves, most of which continue to have proposed protection status. The following table lists the protected areas in the region.

3.5.3 State of advancement of the regional network of protected areas of the MDDEP

The network of protected areas in the Abitibi-Témiscamingue region comprises 28 protected areas managed by the MDDEP, of which 13 now have permanent protection status.

Table 9. Protected areas in the Abitibi-Témiscamingue region

Type of protected area	Number	Area (km²)
Proposed biodiversity reserve	12	2 013.85
Proposed aquatic reserve	2	1 622.24
Biodiversity reserve	2	627.26
Provincial park	1	268.30
White-tailed deer yard	2	89.30
Ecological reserve	8	72.23
Biological refuge	19	52.74
Old-growth forest	27	40.50
Water bird concentration area	44	36.67
Recognized nature reserve	1	30.11
Proposed ecological reserve	1	24.30
Muskrat habitat	12	10.55
Heronry (nesting area and 0 200 m strip)	16	5.06
Rare forest	6	1.71
Habitat of a threatened or vulnerable plant species	1	0.11
Bird colony on an island or a peninsula	7	0.02
Total	161	4 867.86
Taking into account overlapping		4 103.42

MDDEP, november 2012

Table 10. Protected areas with permanent protection status

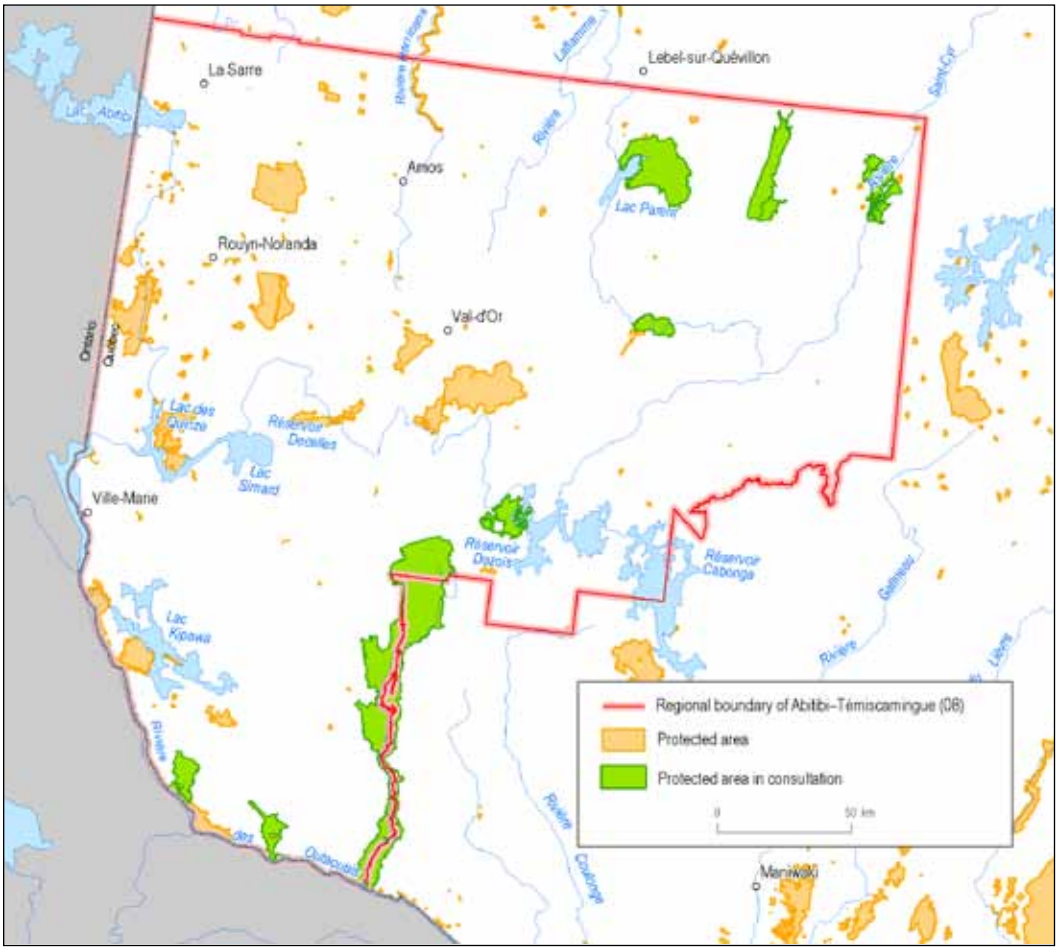
Permanent protected area	Public consultation	Date of creation
Réserve écologique du Lac-Malakisis	Not applicable	September 1978
Parc national Aiguebelle	Not available	February 1985
Réserve écologique des Vieux-Arbres	Not applicable	July 1992
Réserve écologique William-Baldwin	Not applicable	July 1992
Réserve écologique des Dunes-de-la-Moraine-d'Harricana	Not applicable	June 1994
Réserve écologique des Caribous-de-Jourdan	Not applicable	June 1994
Réserve écologique des Kettles-de-Berry	Not applicable	October 1996
Réserve écologique des Dunes-de-Berry	Not applicable	January 1997
Habitat floristique de l'Île-Brisseau	Not applicable	May 1998
Réserve écologique Chicobi	Not applicable	April 2002
Réserve naturelle du Marais-Kergus	Not applicable	May 2003
Réserve de biodiversité des Lacs-Vaudray-et-Joannès	Fall of 2004	Proposed: February 2003 Permanent: January 2007
Réserve de biodiversité des Caribous-de-Val-d'Or	Fall of 2004	Proposed: February 2003 Permanent: April 2009

Table 11. Protected areas with a proposed protection status

Proposed protected area	Date of creation	Permanent status targeted	Public consultation	Permanent status
Réserve écologique projetée du Ruisseau-Clinchamp	October 2002	Ecological reserve	Pending	Pending
Réserve de biodiversité projetée des marais du lac Parent	July 2004	Biodiversity reserve	Current	Pending
Réserve de biodiversité projetée de la forêt Piché-Lemoine	July 2004	Biodiversity reserve	Spring of 2007	2012
Réserve de biodiversité projetée du lac des Quinze	July 2004	Biodiversity reserve	Spring of 2007	2012
Réserve de biodiversité projetée du réservoir Decelles	July 2004	Biodiversity reserve	Spring of 2007	2012
Réserve de biodiversité projetée du lac Opasatica	July 2004	Biodiversity reserve	Spring of 2007	2012
Réserve aquatique projetée de la Haute-Harricana	July 2004	Réserve aquatique	Pending	Pending
Réserve de biodiversité projetée du lac Wetetnagami	September 2005	Biodiversity reserve	Current	Pending
Réserve de biodiversité projetée du lac Saint-Cyr	September 2005	Biodiversity reserve	Current	Pending
Réserve de biodiversité projetée d'Opémican	March 2007	Provincial park	June 2012	Pending
Réserve de biodiversité projetée des Dunes-de-la-Rivière-Attic	March 2007	Biodiversity reserve	Current	Pending
Réserve de biodiversité projetée de la Vallée-de-la-Rivière-Maganasipi	June 2008	Biodiversity reserve	Current	Pending
Réserve aquatique projetée de la Rivière-Dumoine	June 2008	Réserve aquatique	Current	Pending
Réserve de biodiversité projetée Wanaki	June 2008	Biodiversity reserve	Current	Pending
Réserve de biodiversité projetée des Basses-Collines-du-Ruisseau-Serpent	June 2008	Biodiversity reserve	Current	Pending

Figure 17. The current network and the eight protected areas in the Abitibi-Témiscamingue region covered by this public hearing

Four of the 14 proposed aquatic reserves and biodiversity reserves have been subject to a consultation conducted by the BAPE and are in the process of obtaining permanent protection status.



3.6 General gap analysis of the network of protected areas in the Abitibi-Témiscamingue region

In 2009, a gap analysis was carried out for the entire network of protected areas within the framework of the deliberations that led to the drafting of the *Portrait du réseau d'aires protégées au Québec – Période 2002-2009*. The findings of the analysis are enabling the MDDEP to target certain priorities with a view to elaborating the next strategic action plan on Québec's protected areas, which seeks to increase the Québec network of protected areas from 8% to 12% of Québec's territory. A profile and a more thorough gap analysis for the Abitibi-Témiscamingue administrative region were produced. In order to propose a coherent ecological analysis, the gap analysis was produced on the basis of the natural regions that overlap the administrative boundaries of the Abitibi-Témiscamingue region. Accordingly, readers will note, as the maps accompanying the comments in this section show, that the territories studied go beyond the region's administrative boundaries. The profile and the gap analysis appear in detail in "Portrait du réseau d'aires protégées au Québec – Analyse de carence écorégionale – Région administrative de l'Abitibi-Témiscamingue." This section presents the key observations in the document.

In particular, the gap analysis revealed the strengths and weaknesses of the existing network of protected areas at the regional level. The shortcomings observed will make it possible to determine in a concerted manner in the coming years the regional targets for creating new protected areas to attain the 12% objective in Québec. Moreover, they will make it possible to target the enhancements necessary to increase the representativeness and efficacy of existing protected areas. A summary of the findings of the gap analysis is presented to illustrate how the modifications in the boundaries of the eight protected areas could further enhance the representativeness of the regional network of protected areas. Before we examine the findings concerning the representativeness of the shortcomings, let us look at how representativeness is evaluated and why the government has made it its main tool to guide the development of the network of protected areas.

3.6.1 What is representativeness and why is it important?

Québec has an area of 1 667 441 km^2. It is impossible to produce a refined, exhaustive description of its biodiversity. Accordingly, the ecological reference framework proposes dividing Québec into ecological units on different scales. The territory is first divided on a province-wide basis and the initial level of division is called a natural province, which is deemed to consist in parcels of land of roughly 100 000 km^2. Next, each natural province is divided into several natural regions, each with an area of approximately 10 000 km^2. The process continues through the establishment of increasingly small territories (see Figure 5). The approach theoretically allows for the refinement of the division to the level of a topographic feature, i.e. one-eighth of the level of precision offered by units with an area of roughly one hectare (0.01 km^2).

On each scale, different components of the territory can be considered in the analysis, e.g. major geological formations, regional or local geology, geomorphological formations and surface deposits, the river system, landforms (relief, topography), and so on. It is noteworthy that all of these components are of a physical and not a biological nature. Indeed, because it is impossible to ascertain the biodiversity of Québec overall, it is essential to estimate biodiversity in light of the permanent characteristics of ecosystems. Each territorial unit mapped according to the principles of the ecological reference framework constitutes, to some extent, an ecosystem whose physical features reveal the biological environment likely to be found there. Accordingly, at a given latitude, which implies a given climate, a type of physical environment such as a glaciofluvial valley made up of sand and gravel might display a jack pine forest ecosystem. In the jack pine forest accompanied by black spruce, depending on the general topography of the terrain and the river system associated with it, we might expect to find certain specific plant species and wildlife species associated with this type of forest. Thus, based on the physical features of an environment, we can predict the biodiversity likely to develop there, which is presented in this information document as potential vegetation. However, it is a prediction since natural disturbances such as forest fires, epidemics, windthrow or beaver dams, or human disturbances such as logging, roads, buildings, forest fires or changes in drainage, may have created a different biophysical environment. However, we can assume that in the long term, without overly frequent disturbances, the theoretical biodiversity will ultimately be found in the protected territory.

Representativeness and shortcomings

Once we have grasped the ecosystemic relationship, i.e. the link between the territory's physical and biological components, it is possible to determine the ecosystems from which we wish to obtain samples in the network of protected areas. What is more, by ascertaining the ecosystems already found in the network of protected areas, i.e. those that are represented, it is possible to target the territories in which we are likely to find ecosystems not found in the network of protected areas, i.e. the gaps.

The overall objective of the development of Québec's network of protected areas is to attain a situation in which all of Québec's ecosystems, on a given scale, are represented by one sample. The given scale in question can vary depending on needs. However, not all of the scales are appropriate to calculate representativeness and assess gaps. Accordingly, with the knowledge that the MDDEP now possesses concerning Québec's territory overall, the analysis is based on the natural regions, i.e. on units of roughly 10 000 km^2. For each of the natural regions, evaluations are conducted of the proportions of components already protected, including landforms, surface deposits, hydrographic components, type of cover (hardwoods, softwoods, shrubs, and so on), potential vegetation (theoretical forest in the absence of disturbances), tree species groups (actual forest on site), the age class groups of forest stands, the proportions of old-growth forests, and different types of wetlands. Other variables can also be studied. Given that the results are calculated for each natural region, a more precise territorial analytical tool will be used, i.e. physiographic units, equivalent to territories on the order of 1 000 km^2. In particular, we can seek to create a protected area in a physiographic unit in which none is present. If need be, it is possible to work at an even more precise scale, i.e. the ecological district, for territories on the order of 100 km^2.

The interest of protecting one territory rather than another one that appears to have the same physical features will be evaluated according to the potential and existing biological components, above all forest-related ones (a mature forest is usually of greater interest than a former cutting area), and in light of the state of the environment, especially from the standpoint of anthropogenic disturbances, which can be revealed, in particular, by the rate of fragmentation of the territory.

In short, it is important to attain representativeness as an overall objective since it ensures that all types of Québec ecosystems will have a protected sample that can evolve in the most natural conditions possible in the long term. However, although representativeness is the main guideline in the development of the network of protected areas, it can be relevant to protect other elements, e.g. the presence of the habitats of threatened or vulnerable plant or wildlife species, outstanding landscapes, or sites of cultural or historic interest to the Aboriginal peoples and local communities.

Lastly, it should be noted that beyond calculations of representativeness that may appear in a table and thus be added up until the desired objective is attained, e.g. 8% or 12% of a given type of ecosystem in a given natural region, the coherence of the boundaries of a protected area, called its configuration, is very important and cannot be expressed in statistics. However, this qualitative aspect can be taken into account by means of the ERF. Accordingly, at the territorial level in a given protected area, ecological units can be mapped according to the ERF approach, thereby facilitating an understanding of the true boundaries of the ecosystem that we wish to protect. Knowledge of the ecological boundaries of an ecosystem must serve as a guide for the coherent delimitation of a protected area.

Moreover, when a wildlife species, for example, is targeted as the protection objective, it is important to ascertain its habitat and choose the boundaries of the protected areas accordingly.

3.6.2 Physical representativeness

The network of protected areas in the Abitibi-Témiscamingue region seeks primarily to represent the biodiversity of the Southern Laurentians natural province (C), the Mistassini Highlands natural province (G), and the Abitibi and James Bay Lowlands natural province (F). However, only five natural regions are concerned by this administrative region. It is, therefore, more appropriate to present the highlights of the profile of the network of protected areas and the gap analysis based on the natural regions, i.e. the Abitibi Plain natural region (F02), the Lake Témiscamingue Lowlands natural region (F01), the Mégiscane Lake Hills natural region (G01), the Dumoine Plateau natural region (C01), and the La Vérendrye Hillocks natural region (C02). However, the analysis of physical environments is conducted at a more precise scale, i.e. the physiographic unit, which allows for better spatialization of elements of representativeness and shortcomings and, for the purposes of the future development of the network of protected areas, to properly locate the ecosystems sought.

As noted earlier, 6.3% of the geographic area of the Abitibi-Témiscamingue administrative region is now protected. While the percentage of protected areas in a sector does not guarantee the representativeness of biodiversity, since certain elements of biodiversity can be overrepresented and other elements underrepresented, this measure provides a first indicator of representativeness. Accordingly, on the basis of the natural regions, whose boundaries go beyond those of the administrative region, the proportions of protected areas are indicated below:

Table 12. Proportion of protected areas by natural region

Natural region (NR)	Area of the NR (km²)	Geographic size of the protected areas (km²)	Percentage of protected areas
Abitibi Plain natural region	27 056.9	1 221.4	4.5%
Lake Témiscamingue Lowlands natural region	13 513.1	1 014.7	7.5%
Mégiscane Lake Hills natural region	13 760.5	666.1	4.9%
Dumoine Plateau natural region	21 424.4	1 520.7	7.1%
La Vérendrye Hillocks natural region	26 785.1	985.6	3.7%
Total (five natural regions):	102 540.0	5 408.5	5.3%

The Lake Témiscamingue Lowlands natural region does not include any of the eight protected areas that are subject to the public consultation. The following sections do not present any information on this natural region.

Abitibi Plain natural region

This natural region can be described as a glaciolacustrine clay and silt plain with fine-grained surface deposits left by the Barlow-Ojibway proglacial lake, which features major depressions covered with wetlands, mainly peat bogs. Some 4.5% of its geographic area is protected. The vast plain is also crisscrossed with glaciofluvial complexes such as eskers. In this natural region (Figure 18), there are numerous shortcomings from the standpoint of the types of physical environments (arrangement of landforms and surface deposits). This is partly attributable to the presence of a high proportion of private land, particularly in the western part, and a large number of mining rights. Indeed, mining rights cover over 35% of the natural region's geographic area and private lands account for 15%.

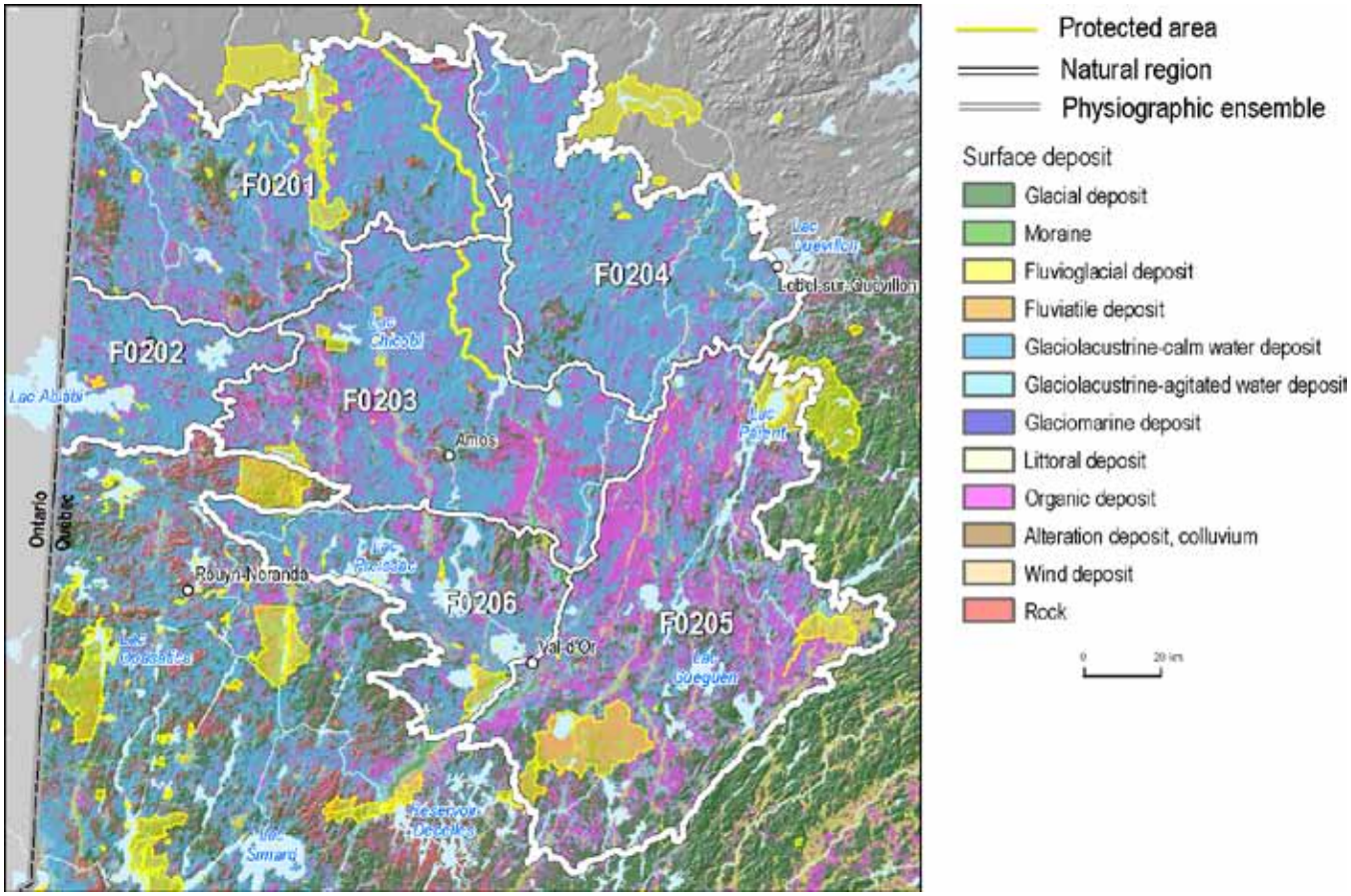
The regional profile of the protected areas is based on the natural region and the gap analysis reveals that the most protected type of environment (physiography and surface deposits) is the plain covered with organic deposits. Some 6.9% of the organic plain ecosystems are protected. These ecological types are partially protected by the Réserve de biodiversité projetée de la forêt Piché-Lemoine, the Réserve de biodiversité projetée des marais du lac Parent, the Réserve de biodiversité projetée des Dunes-de-la-Rivière-Attic et de l'Esker-Mistaouac, and the Réserve de biodiversité des Caribous-de-Val-d'Or. Some 3.7% of the geographic area of the silty-clay plain is protected while 3.9% of the geographic area comprising ecosystems based on forms of hillocks (difference in height of less than 25 m) displaying sand of glaciofluvial origin is protected. There is no protected area in environments displaying heterogeneous, diversified but undulating forms covered with clay and silt. Lastly, the hummocks, the most uneven sectors (average difference in height between 50 m and 100 m) made up of till are scarcely represented in the network of protected areas, account for 1.9% of the area protected.

Given the significant proportion of private lands and the presence of numerous mining rights, increasing the geographic size of protected areas will be a daunting challenge in this natural region, of which 4.5% is now protected. The Réserve de biodiversité projetée de la forêt Piché-Lemoine will nonetheless be expanded when it obtains permanent status, which should allow for the addition to the network of glaciofluvial hillock environments.

As for the two proposed biodiversity reserves covered by this public consultation and located in the natural region, theoretical expansions have been evaluated (see the section entitled "Theoretical expansions under study" for more details on each of the protected areas subject to the consultation).

Given that all types of environments are underrepresented in the Abitibi Plain natural region, any expansion of the two protected areas mentioned earlier will broaden the representativeness of the physical environments in the network of protected areas in this natural region.

Figure 18. The physical representativeness of the Abitibi Plain natural region

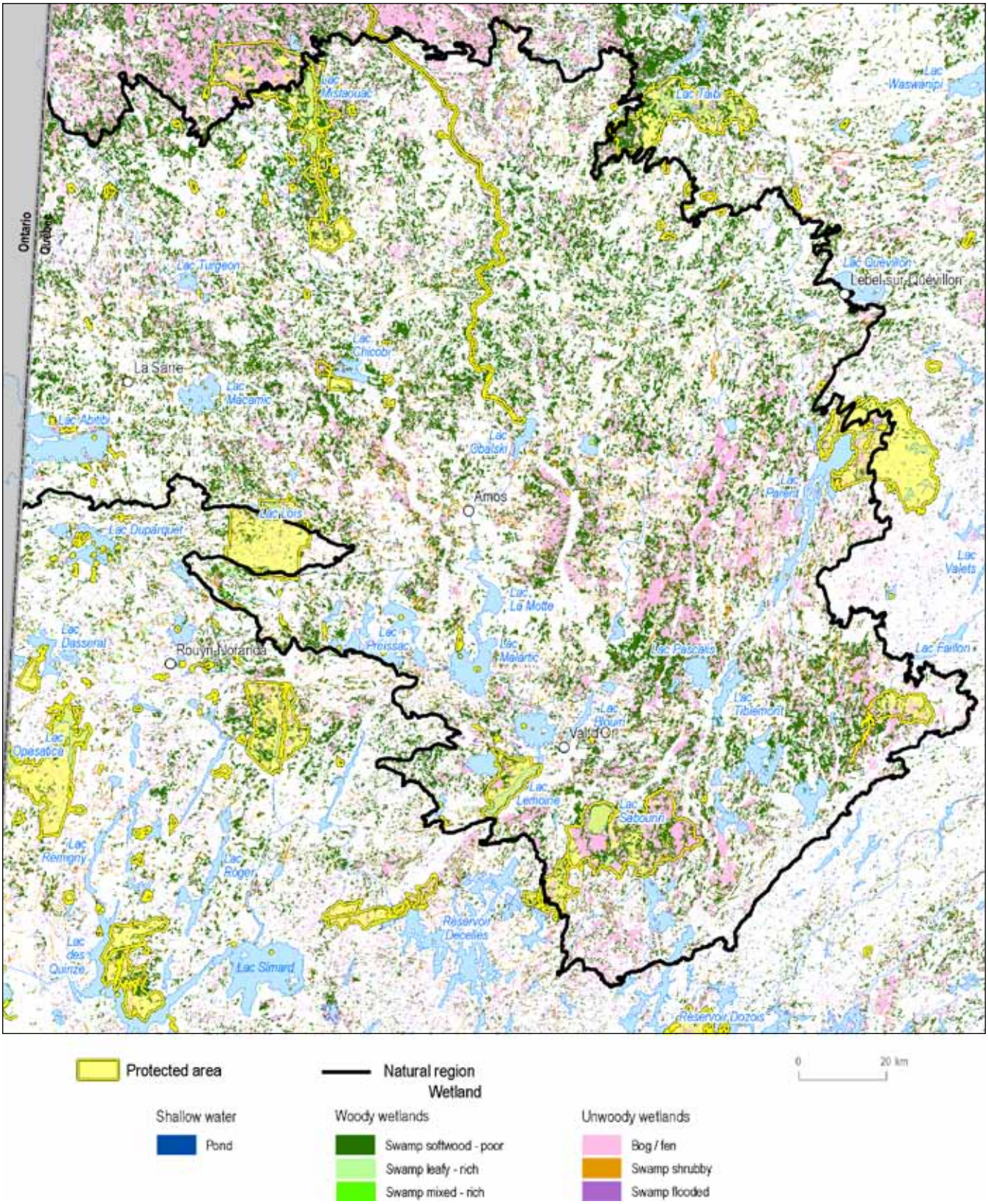


As for surface deposits, while they are frequently linked to landforms (knolls are covered with till and the plain is covered with clay and silt, depressions, peat bogs, and so on), the portrait of the network and the gap analysis reveal that fluvial deposits (13.4%) and eolian deposits (9.6%) are the deposits best represented in the network of protected areas in the Abitibi Plain natural region. The deposits have been accorded a high degree of protection because they are fairly scarce and cover a small area in the natural region overall (0.2% of fluvial deposits and 0.5% of eolian deposits) and were targeted when the protected areas were established. Drumlinoids and dead-ice moraine are rarer still. The geographic area of the drumlinoids protected is 0.6% while dead-ice moraine is not protected at all. The drumlinoids are located north of La Sarre, mainly in the James Bay region. Rock outcrops and glaciofluvial deposits are also scarce in the Abitibi Plain natural region. Glacial deposits, in particular organic and glaciolacustrine deposits, are common. The proportion of such deposits in the network of protected areas ranges from[3].2% to 6.6.%. The anticipated expansion of the Réserve de biodiversité projetée de la forêt Piché-Lemoine will allow for the addition of glaciolacustrine and glacial environments (Harricana moraine section).

Lentic (lakes, marshes and bogs) and lotic (rivers, streams and brooks) protected aquatic environments are well represented. Moreover, 9.4% of the water surface is protected. However, knowledge of the river system in the Abitibi-Témiscamingue region is not sufficient to analyze the shortcomings of different types of aquatic environments.

Wetlands cover over one-third of the Abitibi Plain natural region. Just over 5% of the wetlands are protected (Figure 19). Some 8.2% of open (non-forested) peat bogs are protected, which makes them the best protected, mainly because of the Réserve de biodiversité des Caribous-de-Val-d'Or.

Figure 19. Wetlands in the Abitibi Plain natural region



Mégiscane Lake Hills natural region

This natural region is a vast undulating plain covered with immense groups of hummocks and hillocks. Some 4.8% of its geographic area is protected. The region is made up of two separate physiographic units, the Lac Wetetnagami hummocks and the Lac Mégiscane undulating plain (Figure 20).

The groups of hummocks and hillocks contain glacial deposits, i.e. till, while in the vast plain, depending on the topography, glaciolacustrine deposits of clay and silt are found in flat areas, peat bogs in hollows and depressions and, occasionally, in longilineal networks of sand and gravel of glaciofluvial origin, usually running northeast-southeast, i.e. in the direction of runoff of glacial meltwater during the period of deglaciation. The Réserve de biodiversité projetée du lac Wetetnagami and part of the Réserve de biodiversité projetée des marais du lac Parent are located in the Lac Wetetnagami hummocks physiographic unit (G0101). The Réserve de biodiversité projetée du lac Saint-Cyr is located in the Lac Mégiscane undulating plain (G0102).

From a physiographic standpoint, 5.7% of the hummocks and 49.9% of the hillocks in the ecosystems built on groups of till hummocks and hillocks are represented in the network of protected areas in this natural region. Fairly flat or slightly undulating land with glaciolacustrine deposits (clay and silt), glaciofluvial deposits (sand and gravel) and organic deposits (peat bogs) are less well represented.

Over 50% of the Mégiscane Lake Hills natural region is covered with glacial deposits (till and moraine). Organic deposits (17%), glaciofluvial deposits (8%) and glaciolacustrine deposits (7%) are the most common. All of these types of environments are underrepresented in the network of protected areas in this natural region.

The wetlands in this natural region are extensive since they account for roughly 30% of the territory (Figure 21), although less than 3% of their geographic area is protected. Open or forested peat bogs are the most common types of wetlands and 2.8% and 2.2% of them, respectively, are protected. Some 6.5% of marshes and ponds are protected.

Figure 20. The physical representativeness of the Mégiscane Lake Hills natural region

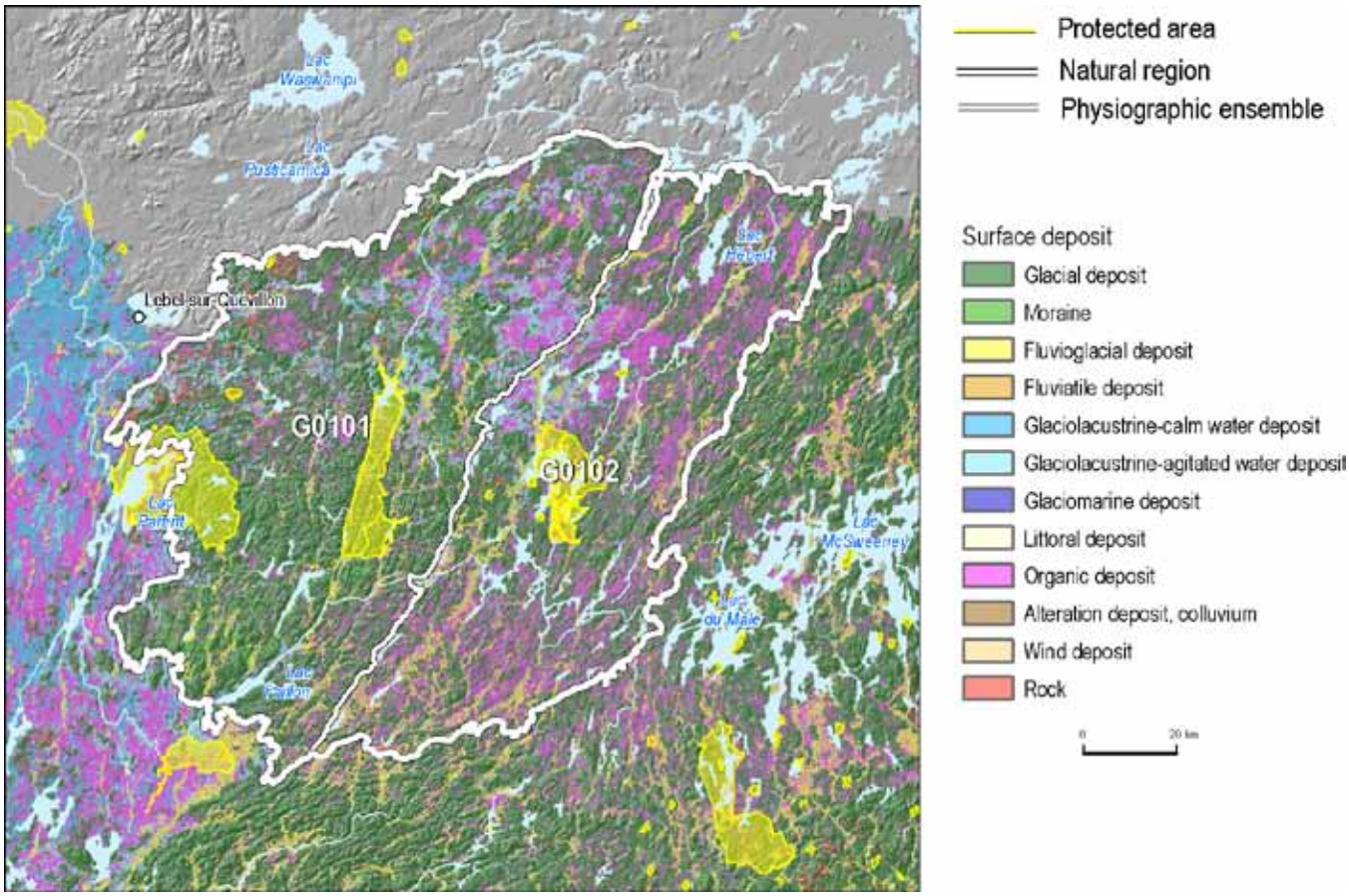
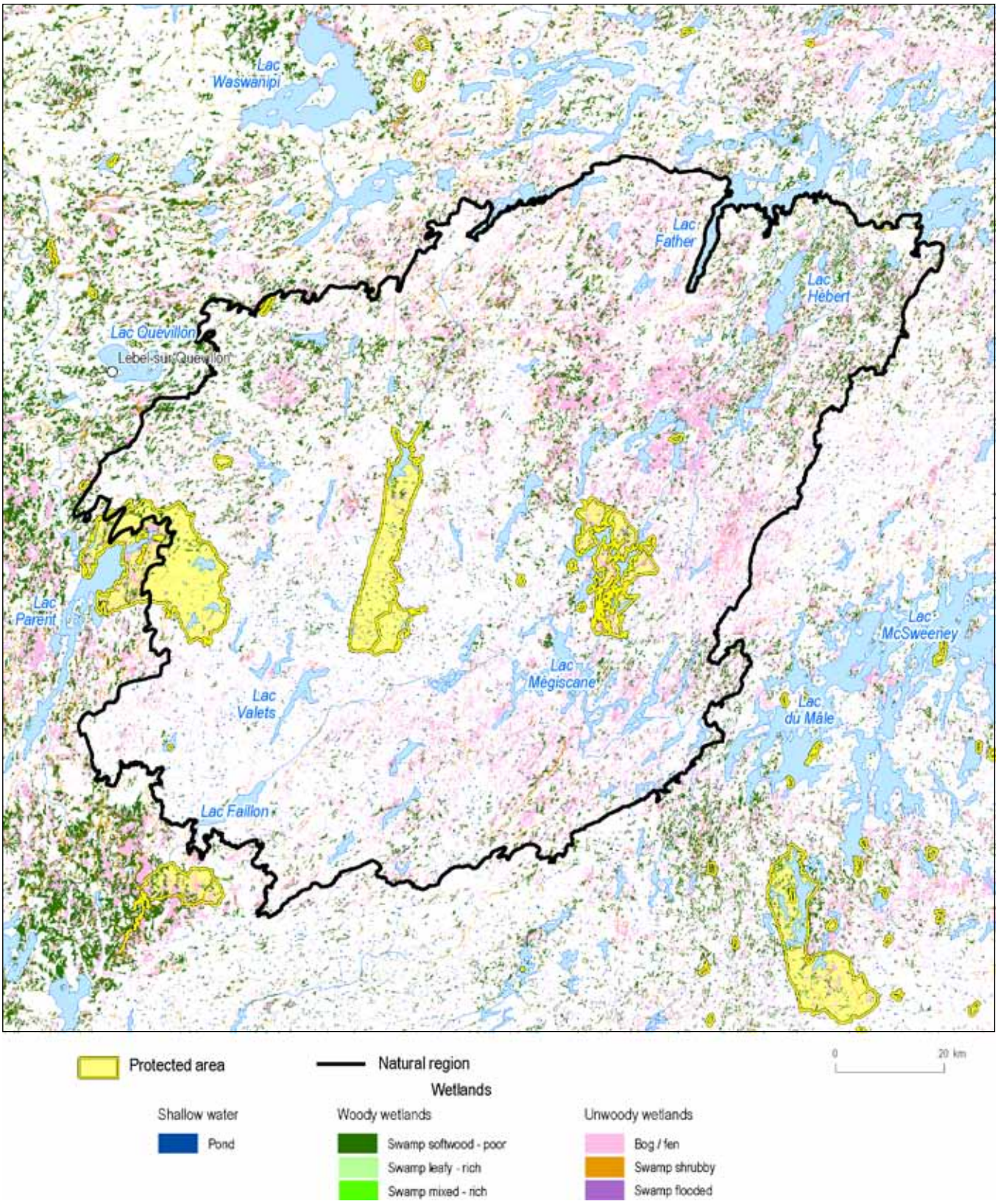


Figure 21. Wetlands in the Lac Mégiscane Hills natural region



La Vérendrye Hillocks natural region

This natural region has three distinct physiographic profiles, i.e. areas with a more pronounced topography (low hills, hummocks and hillocks) of glacial origin, undulating areas, and relatively flat land. Uneven areas are more extensive in terms of the geographic area of this natural region and account for 86% of the territory. The other two typographic profiles are almost equally divided in the remaining geographic area.

The ecosystems developed on the silt hillocks are well represented in the network of protected areas in this natural region (10.3% are protected). Hilly terrain made up of organic deposits is rare (1.1% of the natural region) but widely present in the physiographic province (19.5% of its geographic area is protected). Certain ecosystems in the physiographic units are in no way protected (Figure 22).

With regard to surface deposits, the La Vérendrye Hillocks natural region is mainly made up of till (67%), glaciofluvial sand and gravel in the valleys (11%) and several areas with organic deposits (7%). The other types of deposits are relatively negligible. Roughly 3.5% of each of these predominant types of deposits are protected, which is equivalent to the general level of protection of 3.7% in the natural region. Accordingly, any expansion can satisfy shortcomings in this respect.

Wetlands are scarcer than in the natural regions analyzed earlier and cover less than 10% of the territory (Figure 23), of which just under 4% is protected.

Dumoine Plateau natural region

This natural region comprises numerous groups of hillocks, low hills and silt hillocks, which means that it is slightly more elevated than the surrounding natural regions. Some 7.1% of the region is protected but most of the protected areas are found in its western half, located in the Témiscamingue region.

Figure 22. Physical representativeness of the La Vérendrye Hillocks natural region

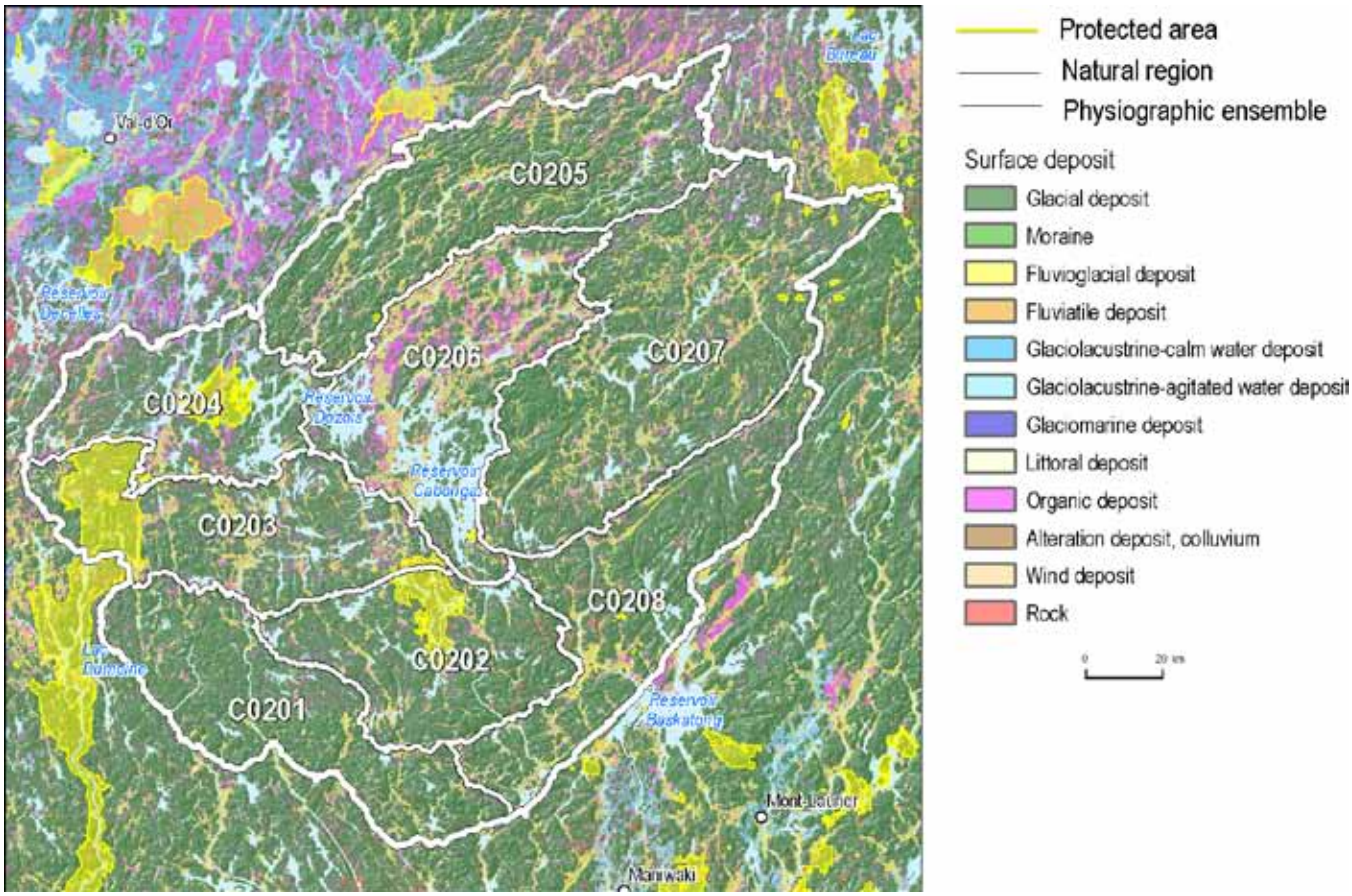
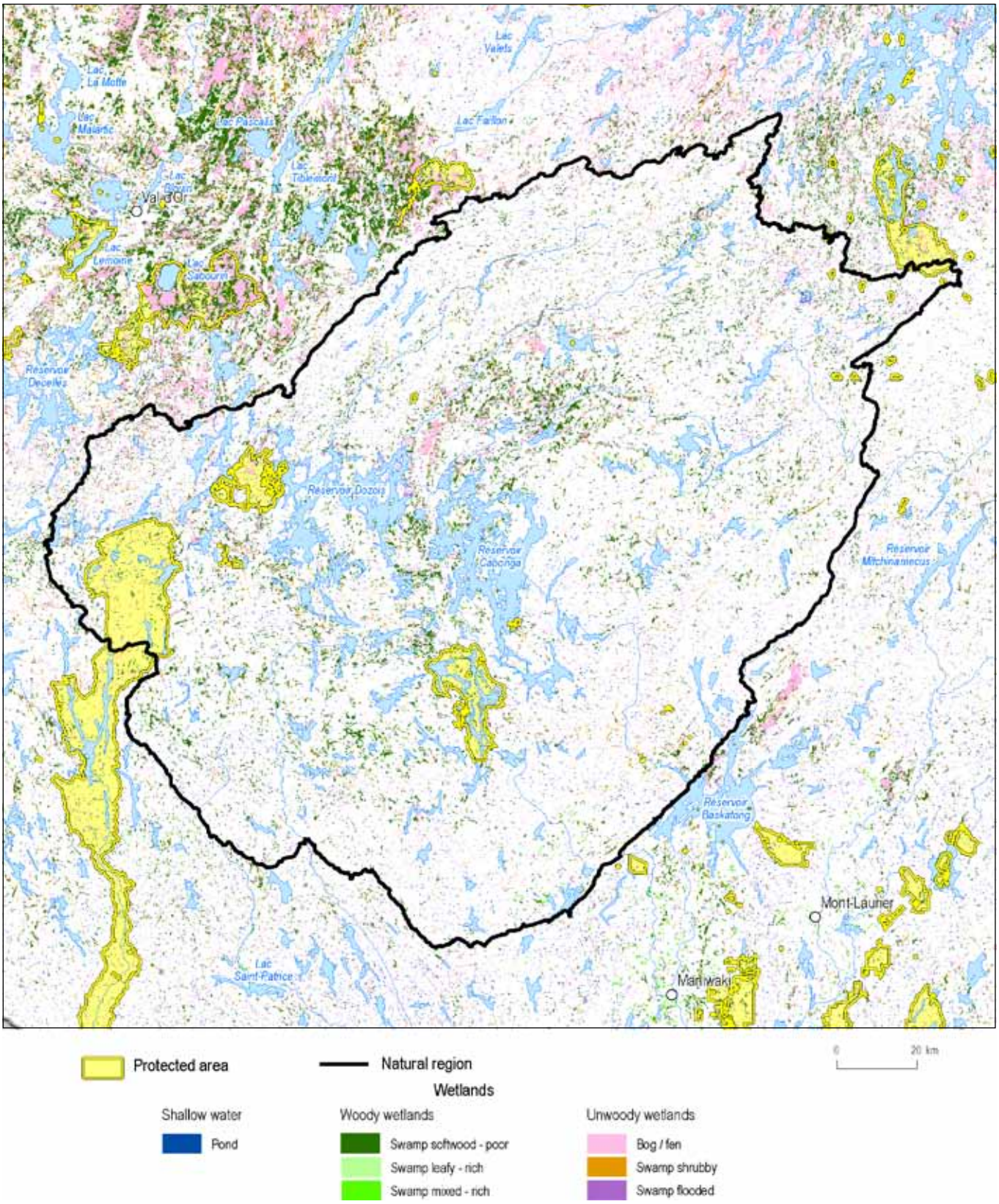


Figure 23. Wetlands in the La Vérendrye Hillocks natural region



Water covers 10.7% of the Dumoine Plateau natural region and 7% of the expanses of water are located in a protected area. The area was shaped by glacial phenomena, which explains the predominance of the low hills, hummocks and silt hillocks that cover over 84% of the natural region. However, it is noteworthy that scarcer physical environments such as valleys, rises and relatively flat land containing glaciofluvial deposits are the most extensively represented in the network of protected areas, and account for 16.3%, 13.5% and 13.1%, respectively, of their protected geographic areas. However, the hummocks and silt hillocks are fairly well represented in the network of protected areas, since 8.6% and 9.1% of them, respectively, are protected. Low hills are the most common environment and are underrepresented (only 0.2% of the area protected).

Several types of relatively rare surface deposits enjoy fairly extensive protection, e.g. glaciomarine deposits and littoral drift located along the Ottawa River. However, only 6.7% of glacial deposits, the most common type (66% of the territory), are protected. Roughly 10% of the geographic areas of the other relatively frequent deposits, i.e. glaciofluvial deposits and rock outcrops, are protected.

In the river system, mention should be made of the extent of the protection of rivers, i.e. the Rivière Dumoine, part of the Rivière Maganasipi and the Ruisseau Serpent, but also the protection of immense Lac Dumoine.

Potential expansions has been evaluated in respect of the three reserves concerned in this natural region, i.e. the Réserve aquatique projetée de la Rivière-Dumoine, the Réserve de biodiversité projetée des Basses-Collines-du-Ruisseau-Serpent and the Réserve de biodiversité projetée de la Vallée-de-la-Rivière-Maganasipi. The possible addition of low hills of till east of the Ruisseau Serpent and in the vicinity of the Rivière Maganasipi would overcome a significant shortcoming in the regional network.

Wetlands are fairly rare in this natural region and cover roughly 6.5% of the territory (Figure 25). Only 5.6% of the wetlands in the natural region are protected.

3.6.3 Representativeness of biological elements

Biological representativeness will be confined to the forest section and the presence of the habitats of threatened or vulnerable species. Accordingly, facets pertaining to plants and wildlife are not analyzed for want of data.

Figure 24. Physical representativeness of the Dumoine Plateau natural region

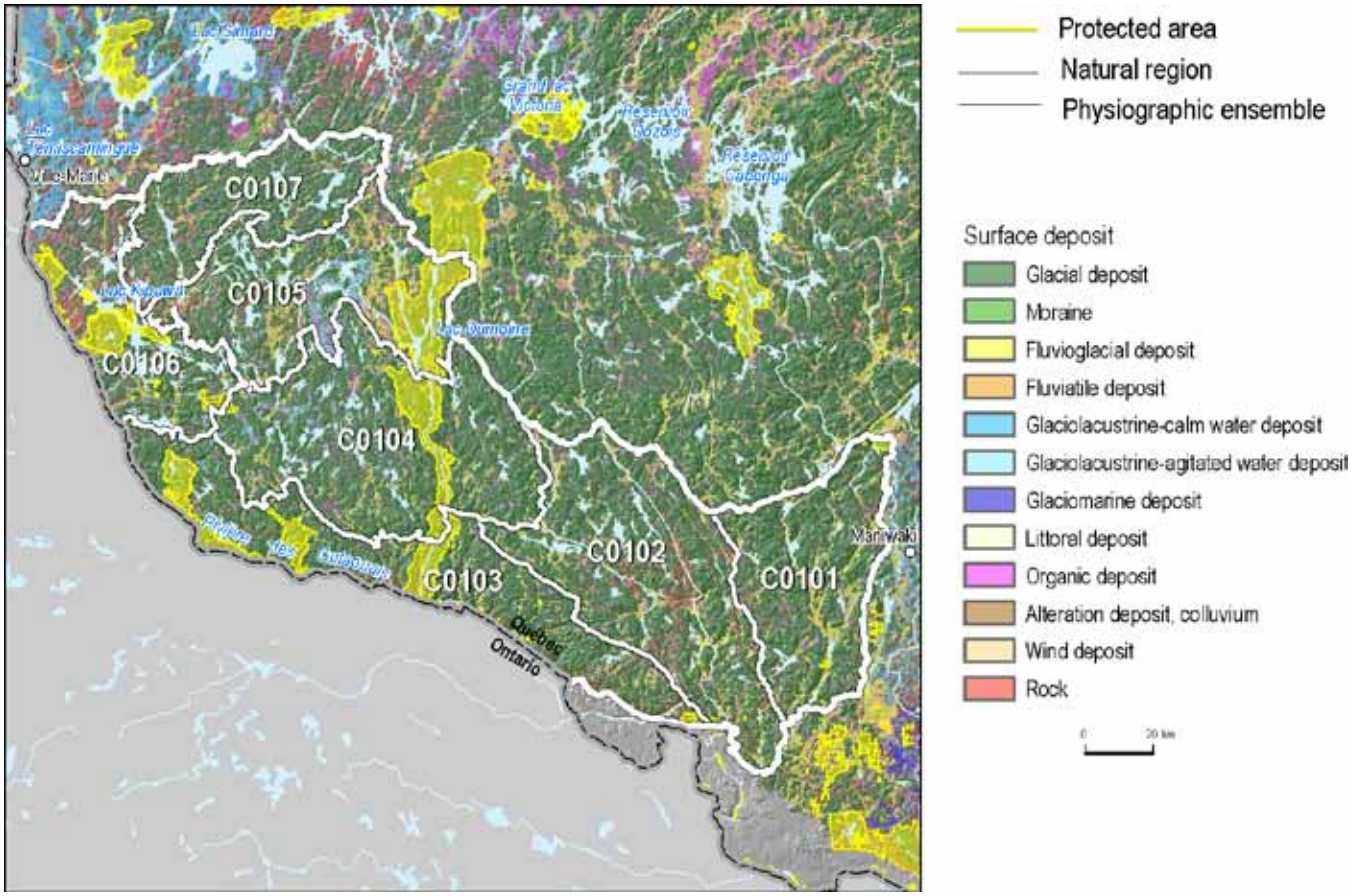
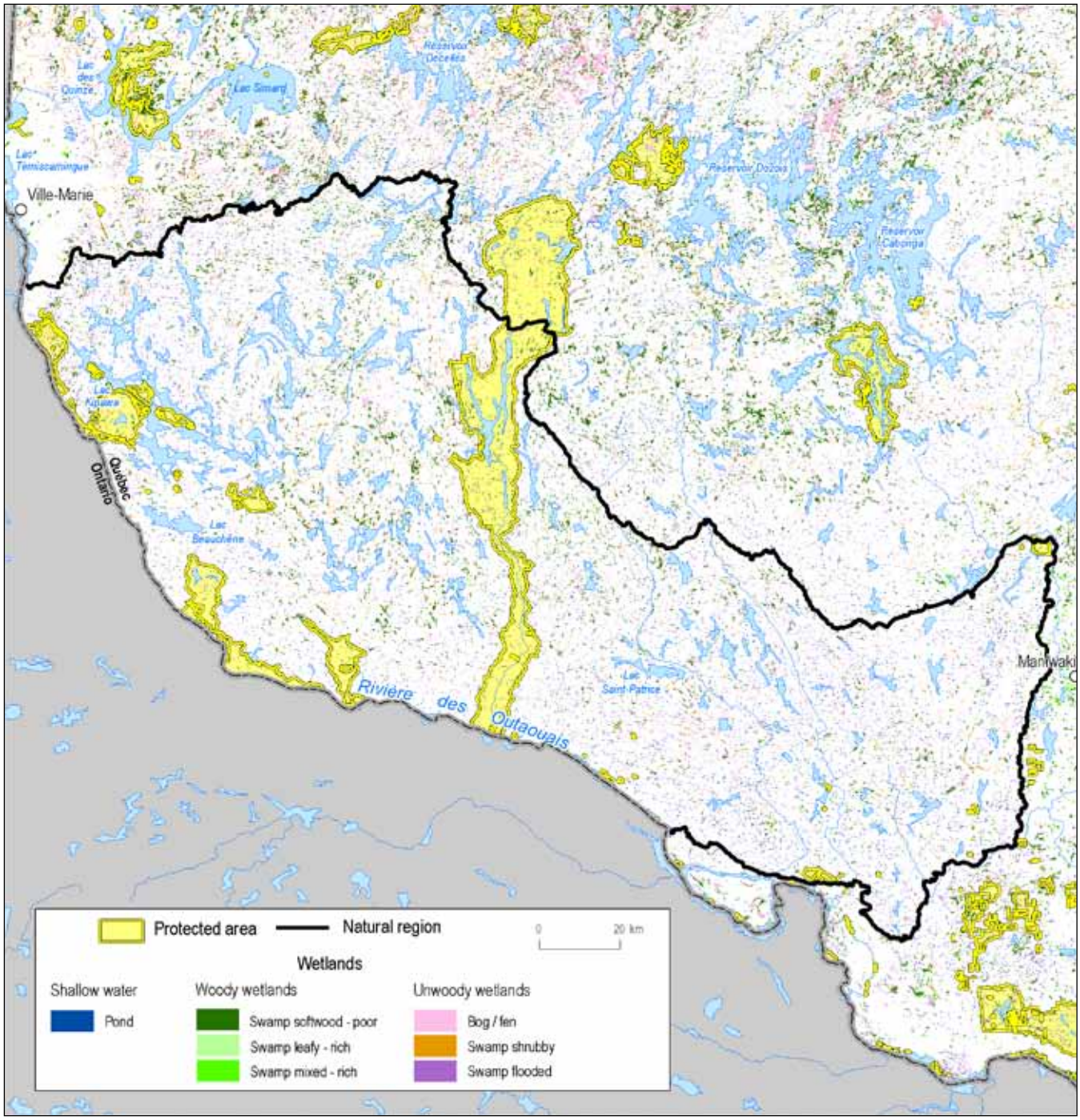


Figure 25. Wetlands in the Dumoine Plateau natural region



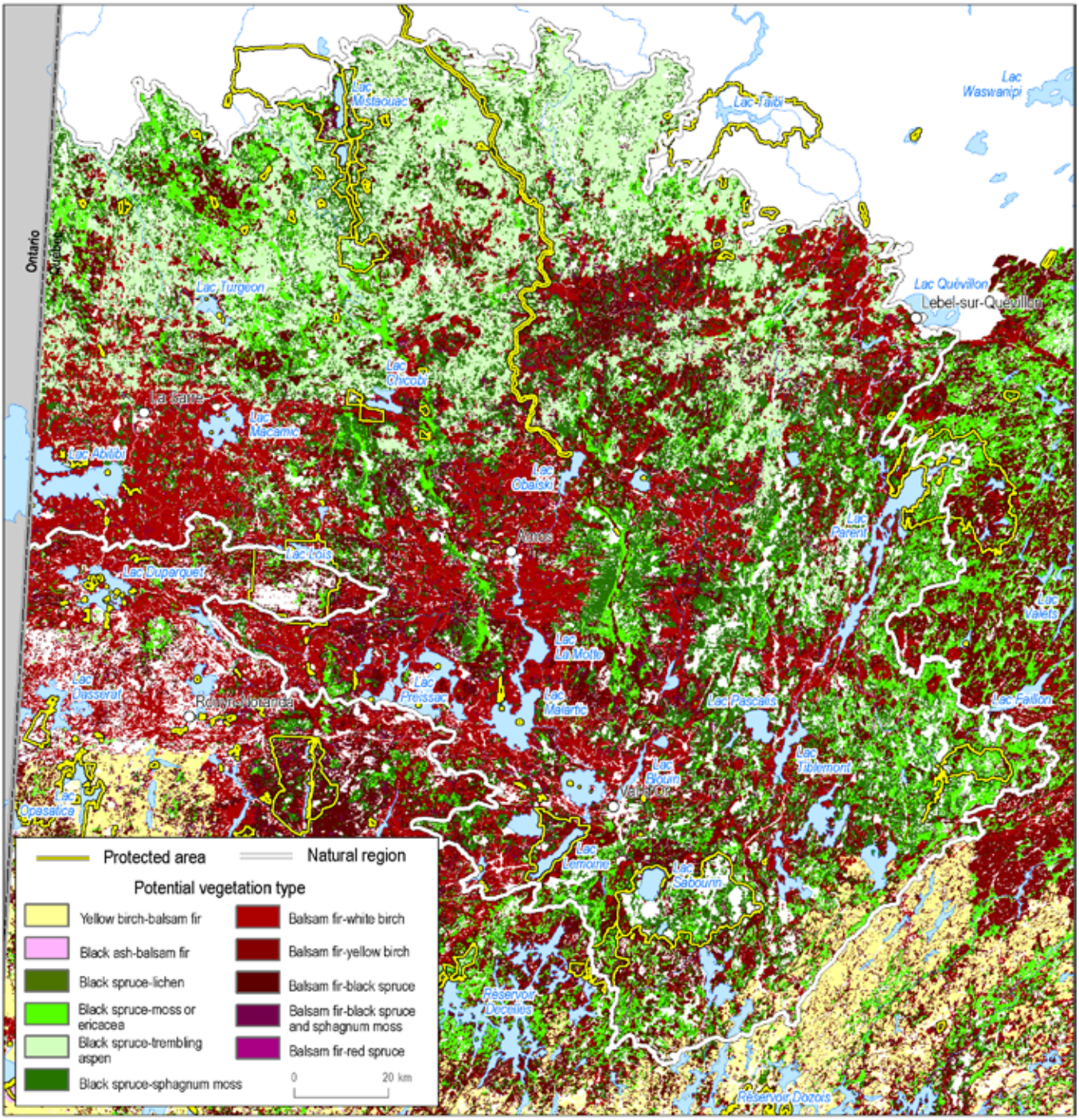
Abitibi Plain natural region

This natural region accounts for 89% of forest land, mainly mixedwood forests (35%) and coniferous forests (22%). Most forest land (82%) is productive and the remaining 18% is unproductive. However, the proportions are different in the network of protected areas. While the protected areas include more productive than unproductive forest land, i.e. 71% and 29%, respectively, in fact 3.8% of the productive forest land is protected, as against 7.3% of unproductive forest land, and 5% of unforested zones. There is thus a tendency to protect more unproductive areas than the average of protection for the natural region overall and, accordingly, there are shortcomings in this respect. The anticipated expansion of the Réserve de biodiversité de la forêt Piché-Lemoine will allow for the addition to the network of productive forest environments.

The types of forest ecosystems, characterized mainly by landforms, surface deposits and their draining in a given climatic zone will make it possible to determine the potential vegetation in each environment. This information is important since it makes it possible to ascertain the forest vegetation likely to be found in the long term in a given territory, including a protected area, notwithstanding the vegetation now present, which may stem from natural or anthropogenic disturbances. The objective is to achieve a good distribution and sound representativeness of different ecological types in the network of protected areas.

It should be noted that, in this natural region, black spruce stands and, to a lesser extent, fir forests, are the most predominant types of potential vegetation (between 2.3% and 6.9% are protected) (Figure 26). Accordingly, the expansion of the Réserve de biodiversité de la forêt Piché-Lemoine will mainly allow for

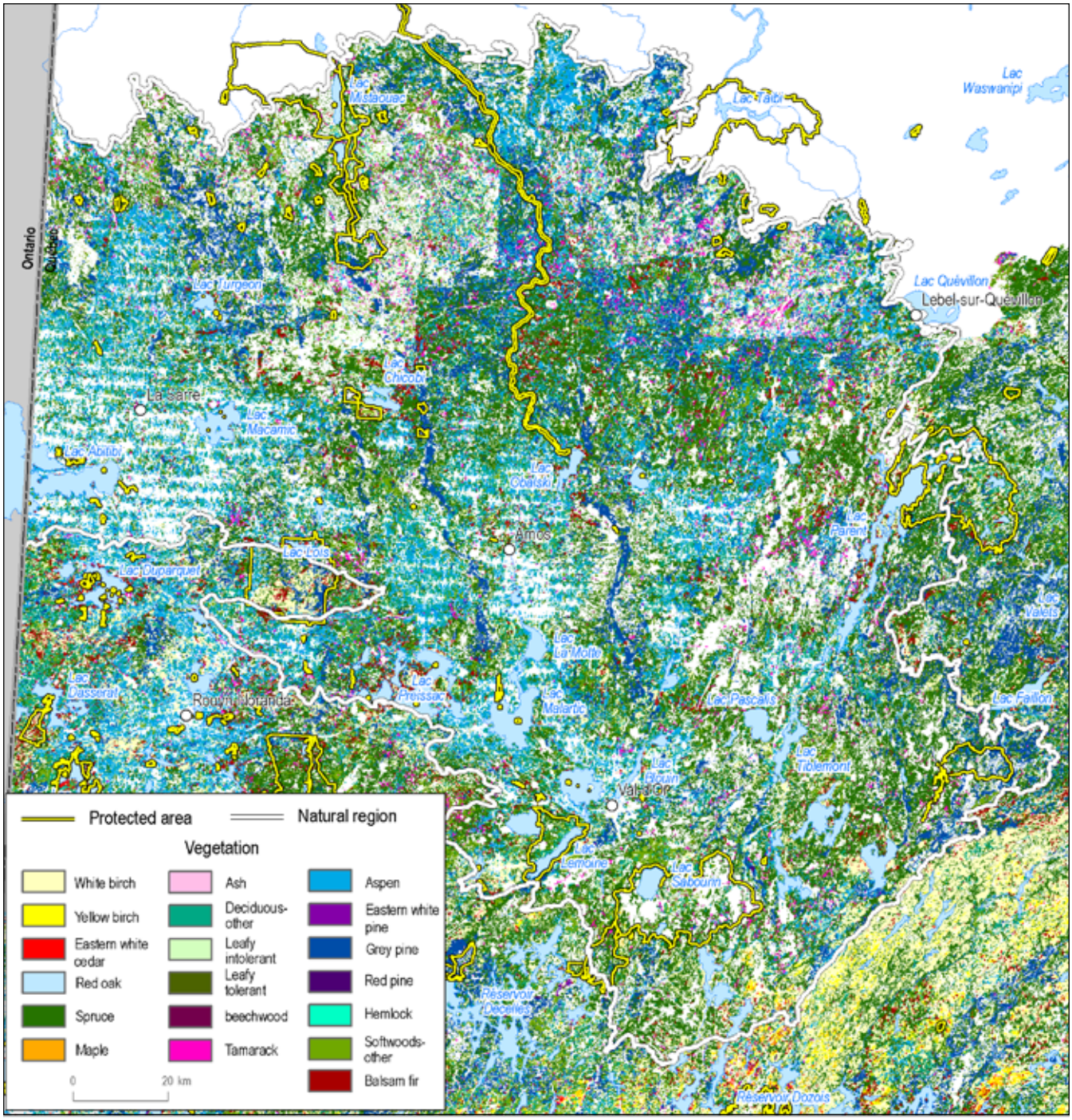
Figure 26. Representativeness of potential vegetation in the Abitibi Plain natural region



the addition of potential balsam fir-white birch stands, a scarcely represented ecological type. Located in less well drained areas, the theoretical expansions to the Réserve des Dunes-de-la-Rivière-Attic would add protection of potential black spruce-sphagnum moss stands and black spruce-moss or black spruce-heath stands. The proposed expansions of the Réserve des marais du lac Parent would add the same two types of potential vegetation but also balsam fir-black spruce stands.

If it is important to take into account potential vegetation in ecological representativeness objectives, it is also important to ascertain the types of forests (or tree species groups) that are actually present in the protected areas and the age of the forest stands in question.

Figure 27. Tree species groups in the Abitibi Plain natural region

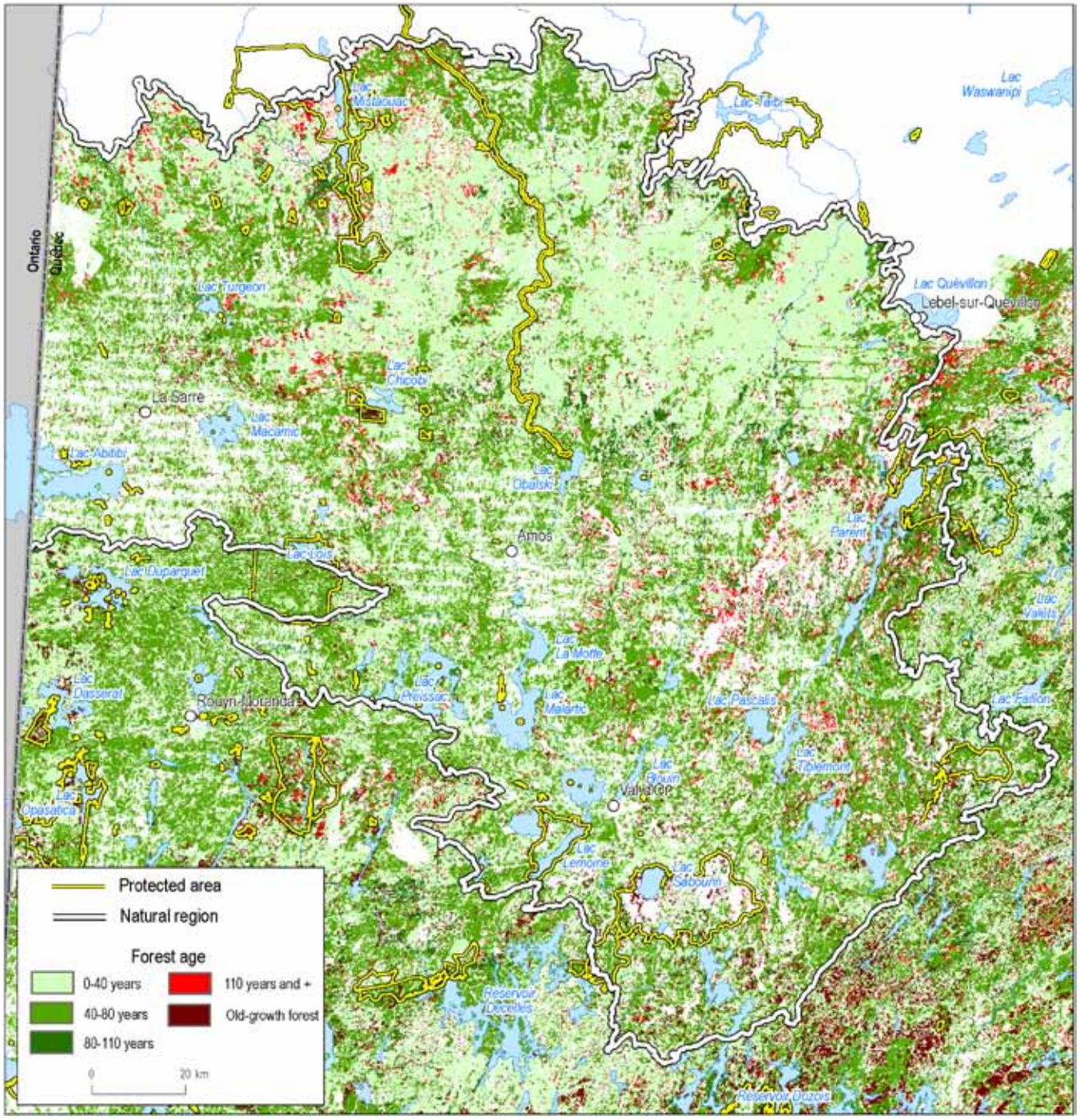


It is noteworthy that black spruce, trembling aspen and jack pine are the tree species groups most represented in the Abitibi Plain natural region. (Figure 27). However, in the protected areas in this natural region, aside from trembling aspen, of which nearly 19% is protected, only yellow birch and maple, two rather rare species, are protected in a proportion of over 8%. White birch and black spruce are also among the most represented species. Roughly 5% of the geographic areas that they occupy are protected.

As for the age class groups of forests, it is noteworthy that forest stands under 40 years old and stands between 40 and 80 years old are the least widespread in the protected areas in this natural region (Figure 28). The older forest stands, i.e. between 80 and 110 years old, 110 years old or over and old-growth forests are the best represented.

This is a positive observation. However, it should be noted that many of the so-called mature or old stands in the network of protected

Figure 28. Age class groups of forest stands in the Abitibi Plain natural region

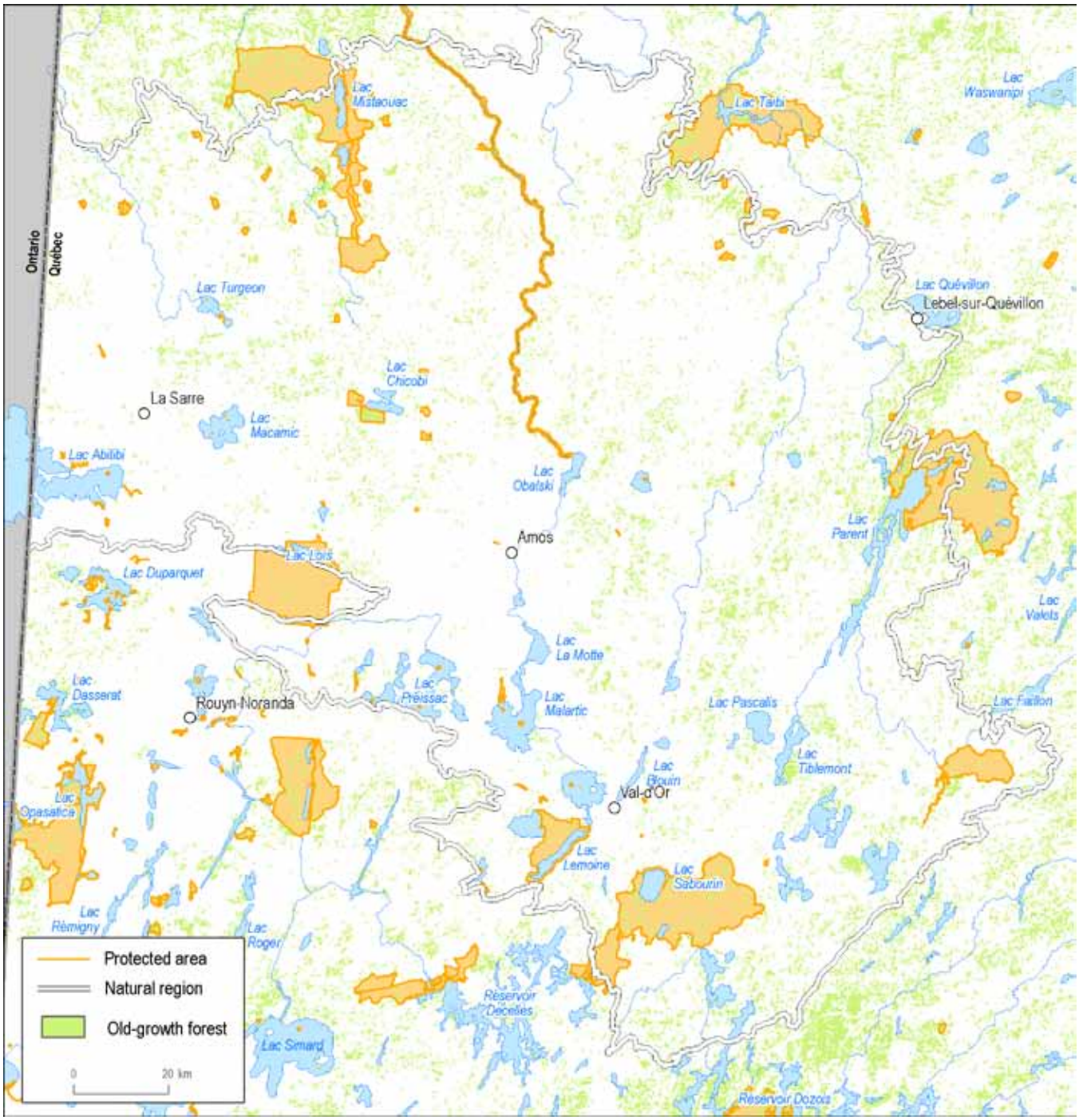


areas are isolated since they are residual stands left in place following logging. In particular, such stands may be inaccessible or associated with barely productive environments. Old-growth forests occupy only 10% of forest areas in the natural region, but 7.4% of old-growth forests are protected (Figure 29). Consequently, in the network of protected areas in this natural region, old-growth forests account for 20% of the forest cover protected.

The anticipated expansions of the Réserve de la forêt Piché-Lemoine will add forests in the under 40 years old and 40 to 80 years old categories. However, it should be noted that the expansions were determined mainly from the standpoint of geomorphological interest, i.e. the presence of a section of the Harricana interlobate moraine.

The Abitibi Plain natural region hosts 24 threatened or vulnerable species, i.e. 15 plant species and nine animal species. Some 58

Figure 29. Location of old-growth forests in the Abitibi Plain natural region



occurrences have been noted, of which eight are at least partially located in a protected area, thereby providing minimal protection for seven species, i.e. four plant species, two bird species and one mammal. The Réserve écologique William-Baldwin alone hosts three species. Four other protected areas each host a single species.

Mégiscane Lake Hills natural region

This natural region has limited hardwood stands, which account for only 1.8% of the forest cover in the natural region. The territory is mainly covered with coniferous forests (32%), shrubs (20%) and mixed-wood forests (20%). Most forest land (84%) is productive and the remaining 16% is unproductive. However, the proportions are different in the network of protected areas. The protected areas include much more extensive productive than unproductive environments, i.e. 90% and 10%, respectively.

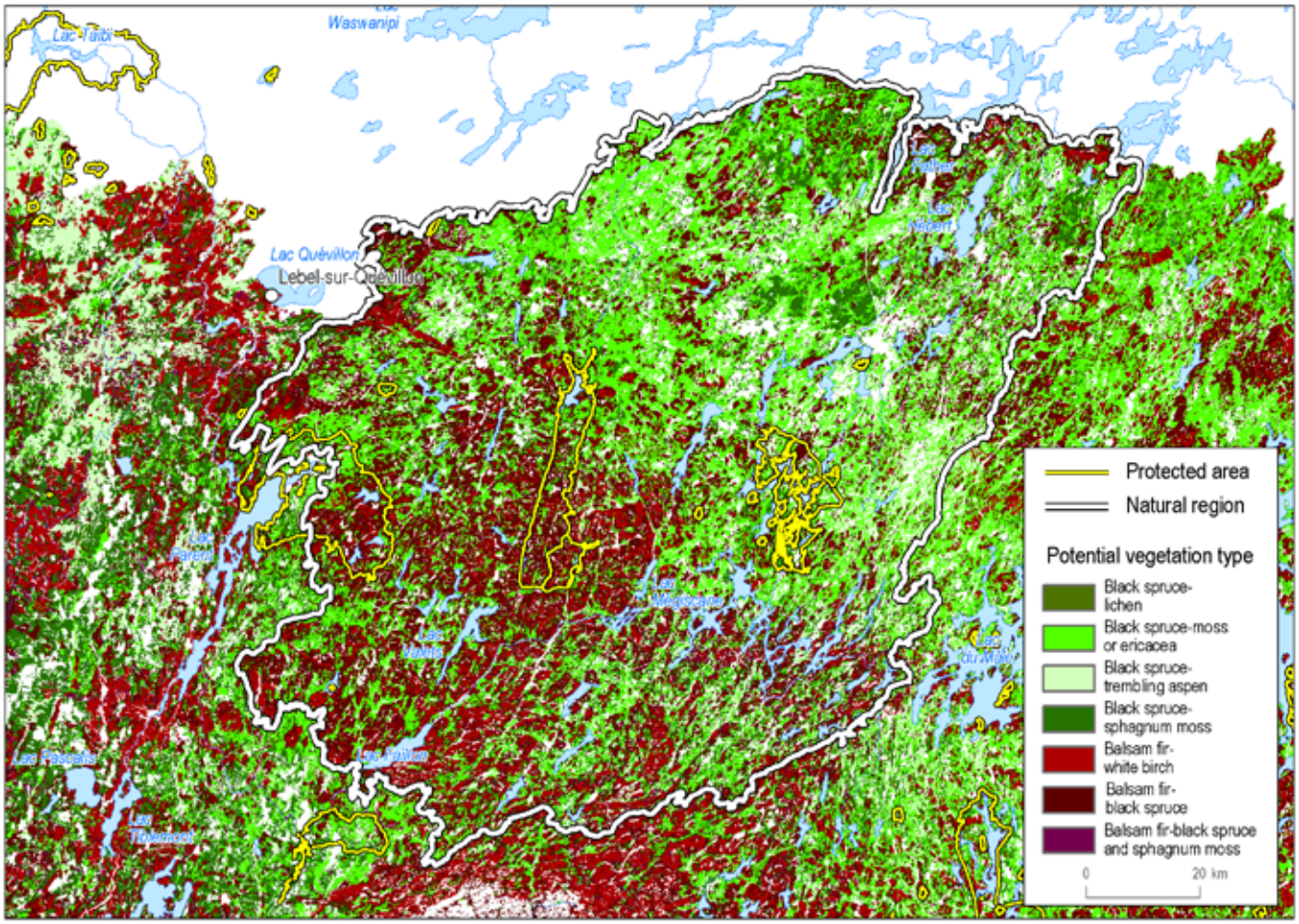
The most widespread types of potential vegetation are spruce stands and fir forests (Figure 30). At this latitude, black spruce-moss stands and black spruce-heath stands predominate. The following table provides data concerning the most common potential vegetation in the natural region and the areas protected for each type of vegetation.

Black spruce stands (58% of the forest cover) and jack pine (18%) are the main existing forest stands. In the protected areas, the most frequent types of forest stands are intolerant hardwoods (white

Table 13. Areas of potential vegetation protected in the Mégiscane Lake Hills natural region

Potential vegetation	Area (km²)	Proportion of the NR (%)	Area protected (km²)	Proportion protected (%)
Black spruce-moss or black spruce-heath stands	4 882.7	35.5	247.3	5.1
Balsam fir-black spruce stands	3 164.3	23.0	170.1	5.4
Balsam fir-white birch stands	1 103.6	8.0	55.8	5.0
Black spruce-sphagnum moss stand	771.3	5.6	23.8	3.1

Figure 30. Representativeness of potential vegetation in the Mégiscane Lake Hills natural region



birch and trembling aspen), while less than 5% of black spruce and jack pine stands are protected (Figure 31).

From the standpoint of the breakdown of the existing forest stands by age class group, young and middle-aged forest stands cover the biggest areas (33% and 28%, respectively) of the forest cover in the natural region (Figure 32). The proportions are more or less the same in the protected areas.

Old-growth forests cover 38% of the forest land in the natural region and account for the same proportion in the network of protected areas in the natural region (Figure 33). However, only 5.1% of old-growth forests are protected.

The Mégiscane Lake Hills natural region hosts four threatened or vulnerable species, i.e. two plant species and two animal species. Six occurrences have been noted, none of which is located in a protected area.

Figure 31. Tree species groups in the Mégiscane Lake Hills natural region

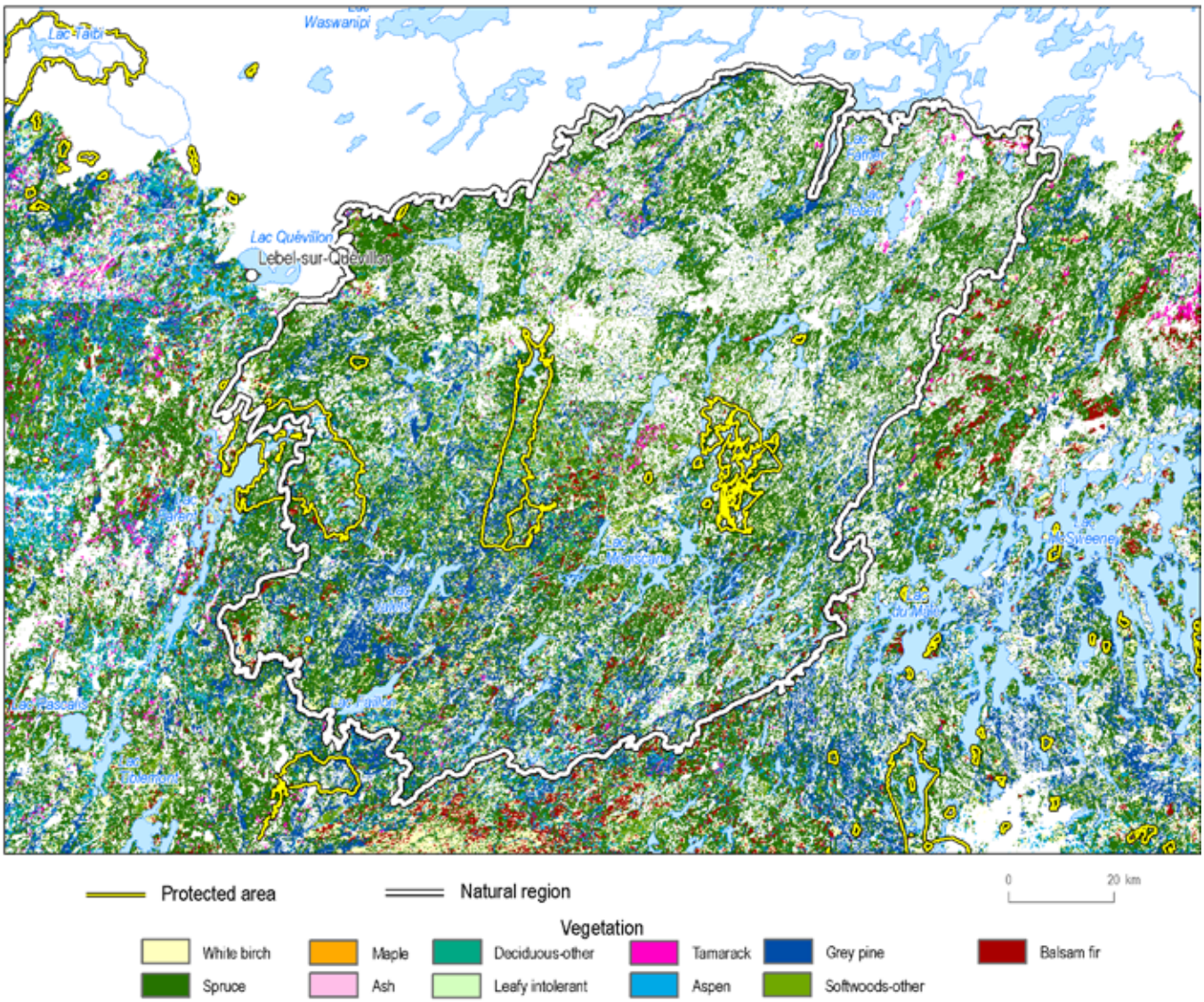


Figure 32. Age class groups of forest stands in the Mégiscane Lake Hills natural region

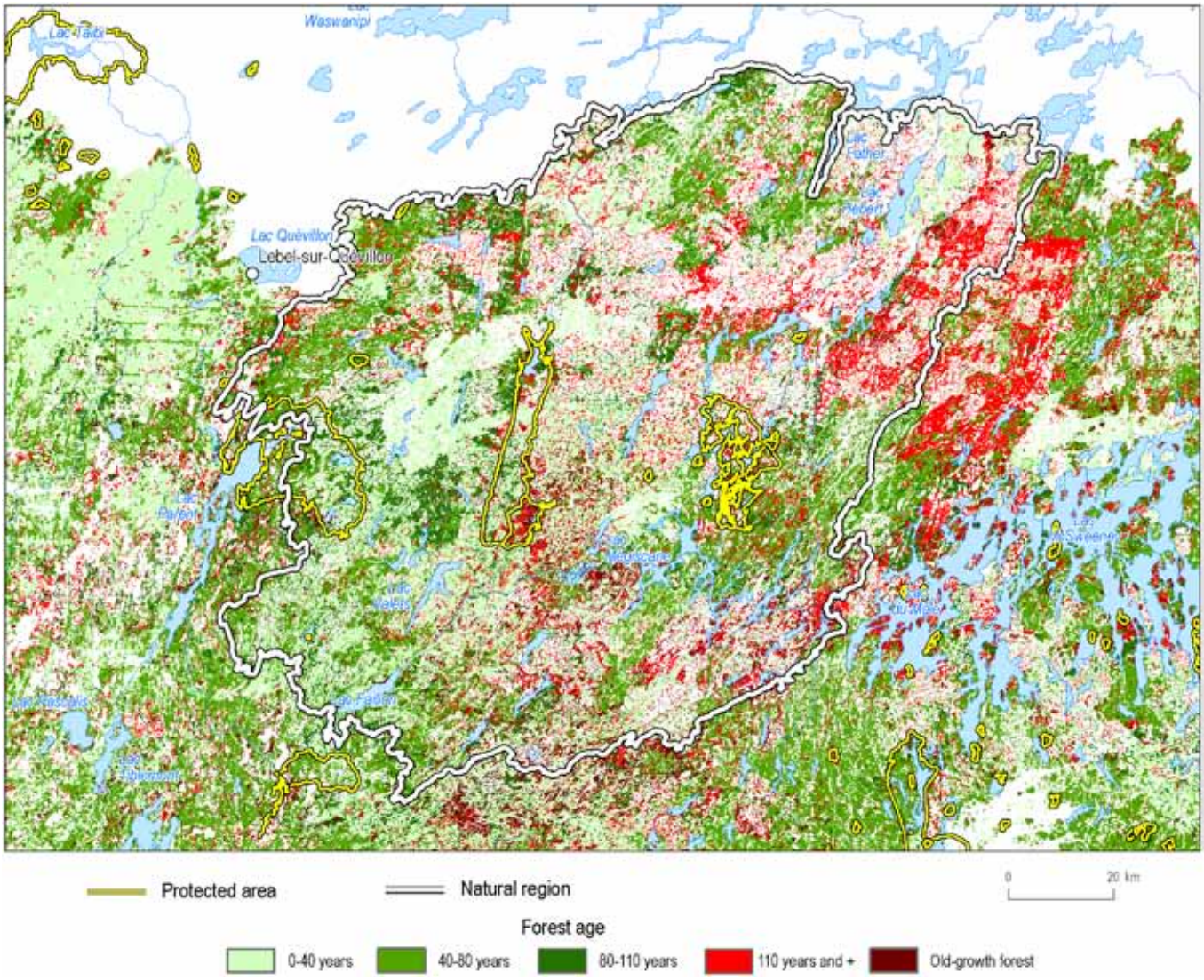
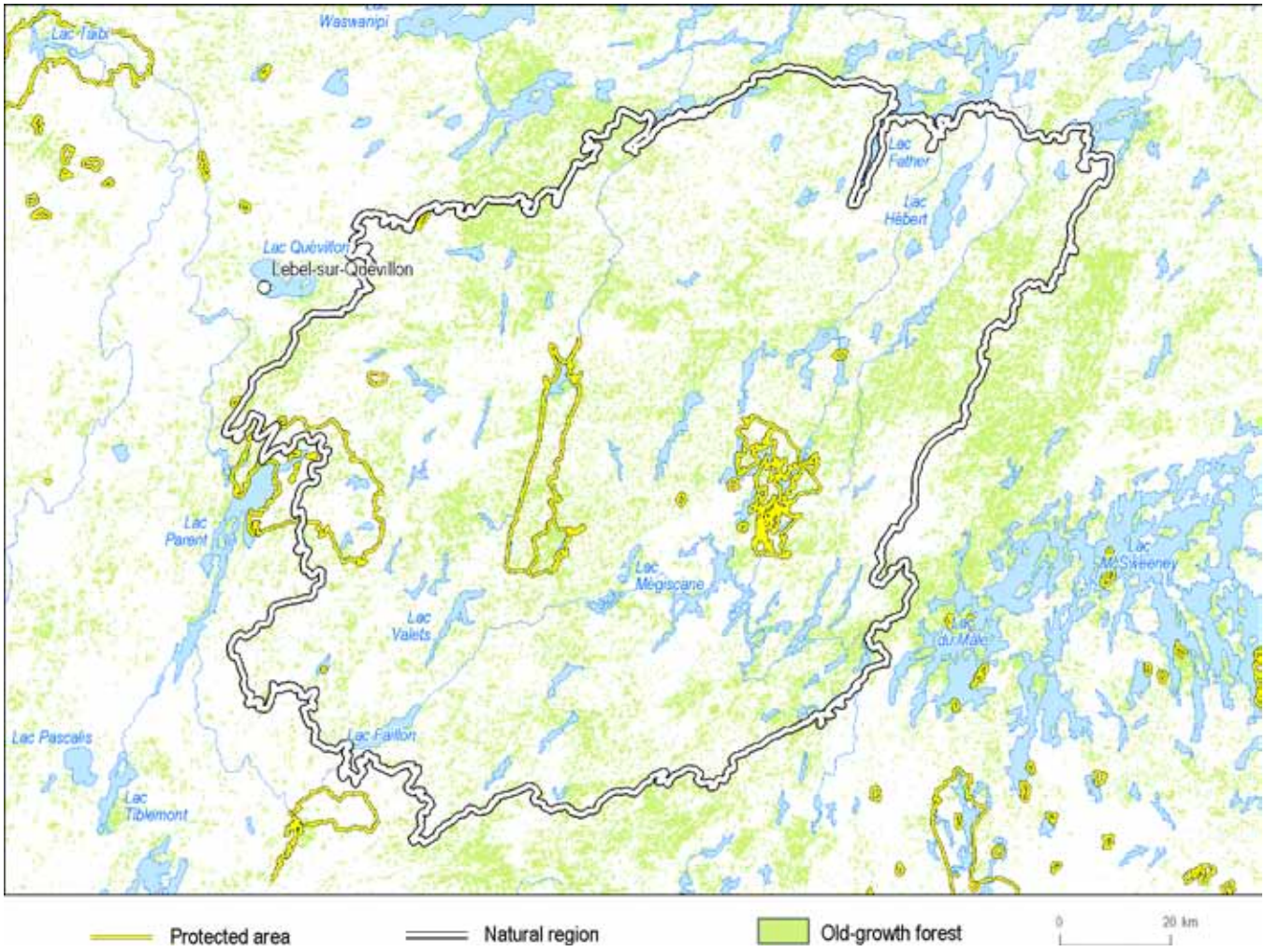


Figure 33. Location of old-growth forests in the Mégiscane Lake Hills natural region



La Vérendrye Hillocks natural region

Mixed-wood forests cover over 50% of the territory. Hardwood and coniferous forests occupy 15% and 13%, respectively, of the territory. Water bodies are widespread and cover over 11% of the territory. The network of protected areas protects between 2.5% and 3.9% of the different types of forest cover, which corresponds to the proportion of protected areas in the natural region, i.e. 3.7%. This suggests that the underrepresentativeness of different types of cover is evenly distributed. Productive forests account for over 95% of the forest areas in the natural region. The protected proportions are similar. However, given the limited protected areas in the natural region, only 3.5% of the productive forests are protected.

The potential vegetation in the natural region is more diversified than in the preceding natural regions (Figure 34). Yellow birch-fir stands (24.3%), birch-sugar maple-fir stands (11.4%) and balsam fir-black spruce stands (13.3%) and balsam fir-white birch stands (11.4%) are the most common species. In the northeastern portion of the natural region, a significant proportion of black spruce-moss stands or black spruce-heath stands are found (6.2%) while sugar maple-yellow birch stands occupy a fairly large area (6.8%) in the southernmost part of the region.

Among the most frequent ecological types, 6.0% of yellow birch-fir stands are protected, while between 1.3% and 2.9% of the other types mentioned are protected. It should be noted that two uncommon ecological types are well represented in the network of protected areas, i.e. balsam fir-cedar stands and white or red pine stands, and that 8.8% and 11.1%, respectively, of their geographic areas are protected.

Figure 34. Representativeness of potential vegetation in the La Vérendrye Hillocks natural region

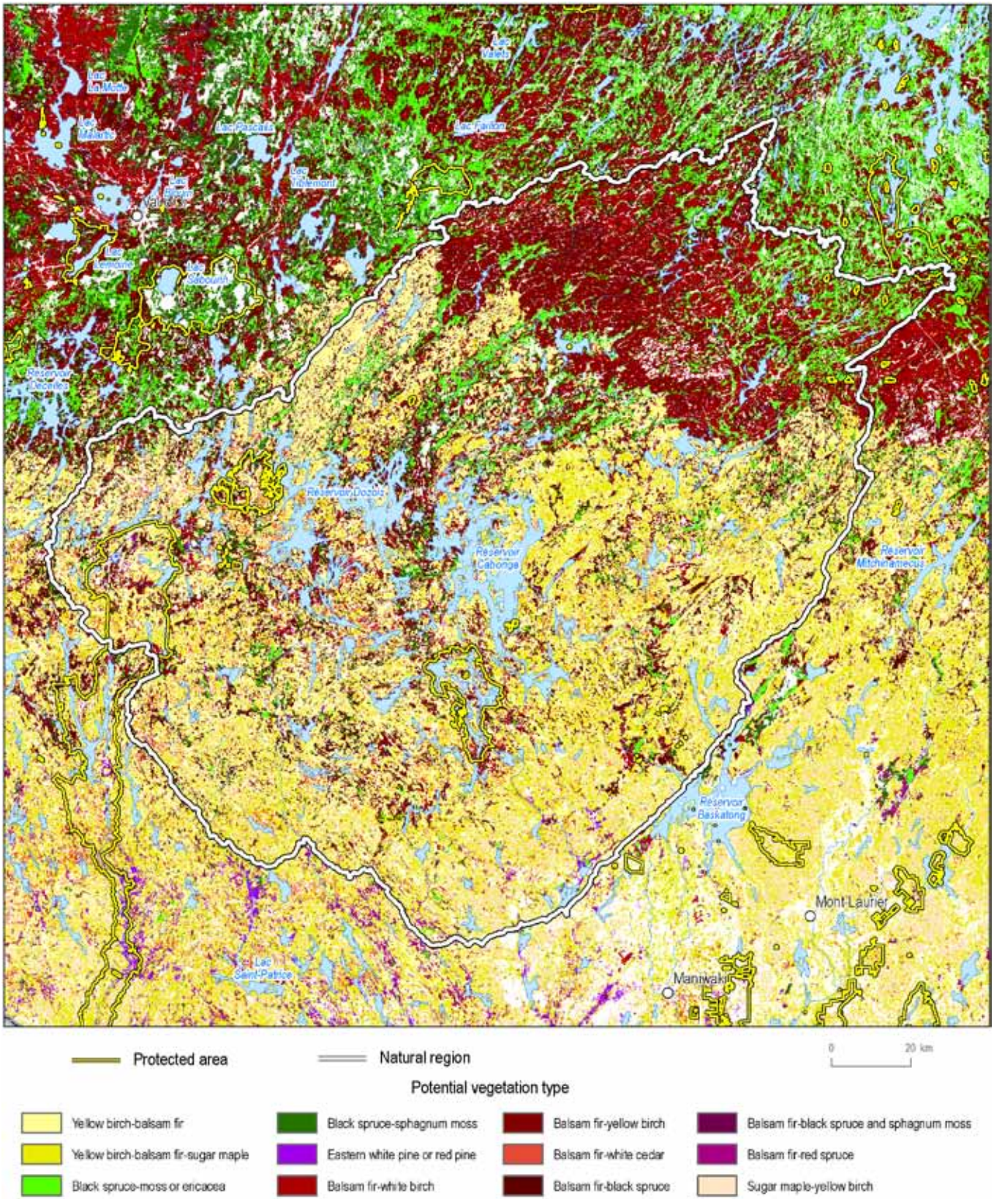


Figure 35. Tree species groups in the La Vérendrye Hillocks natural region

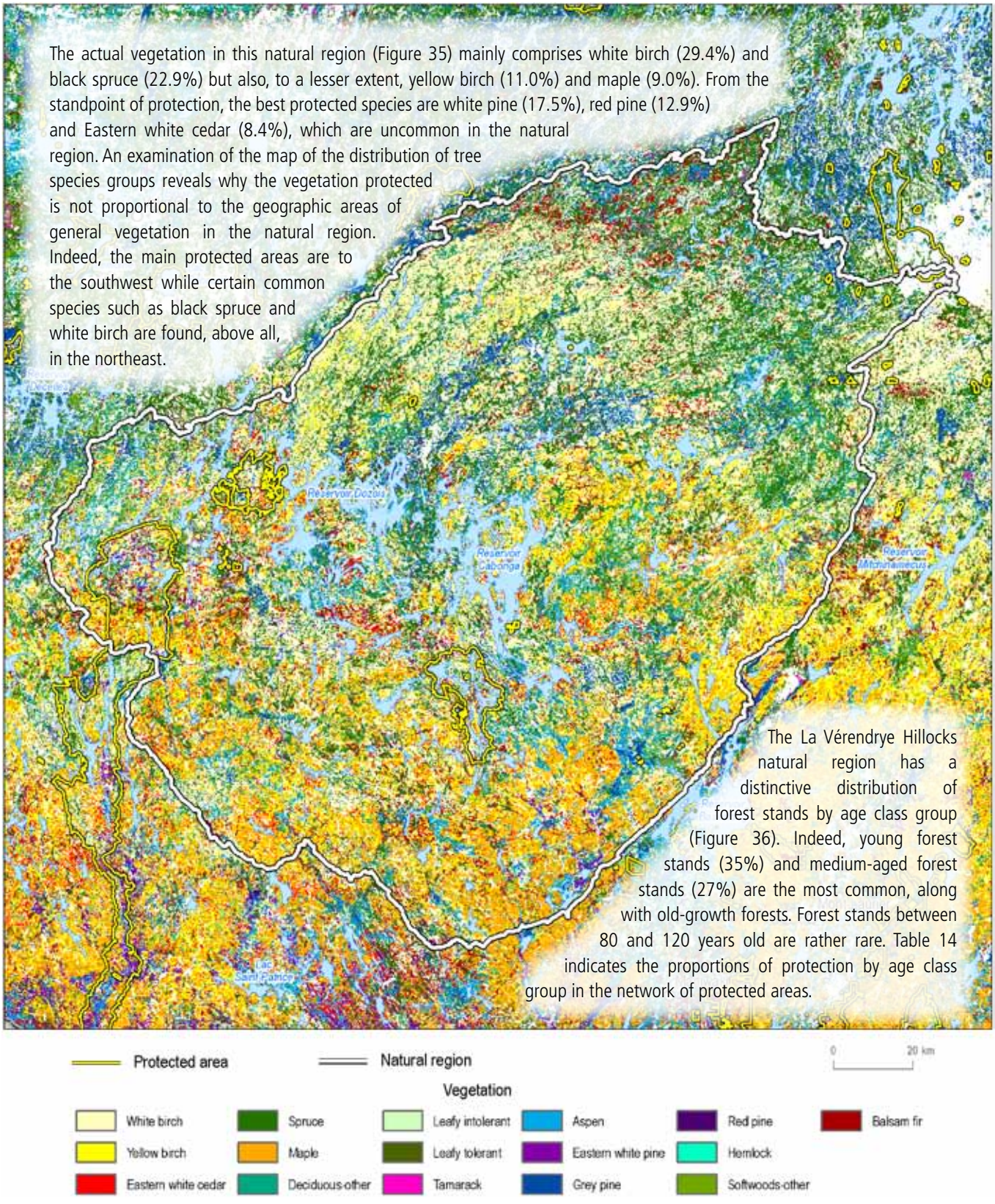
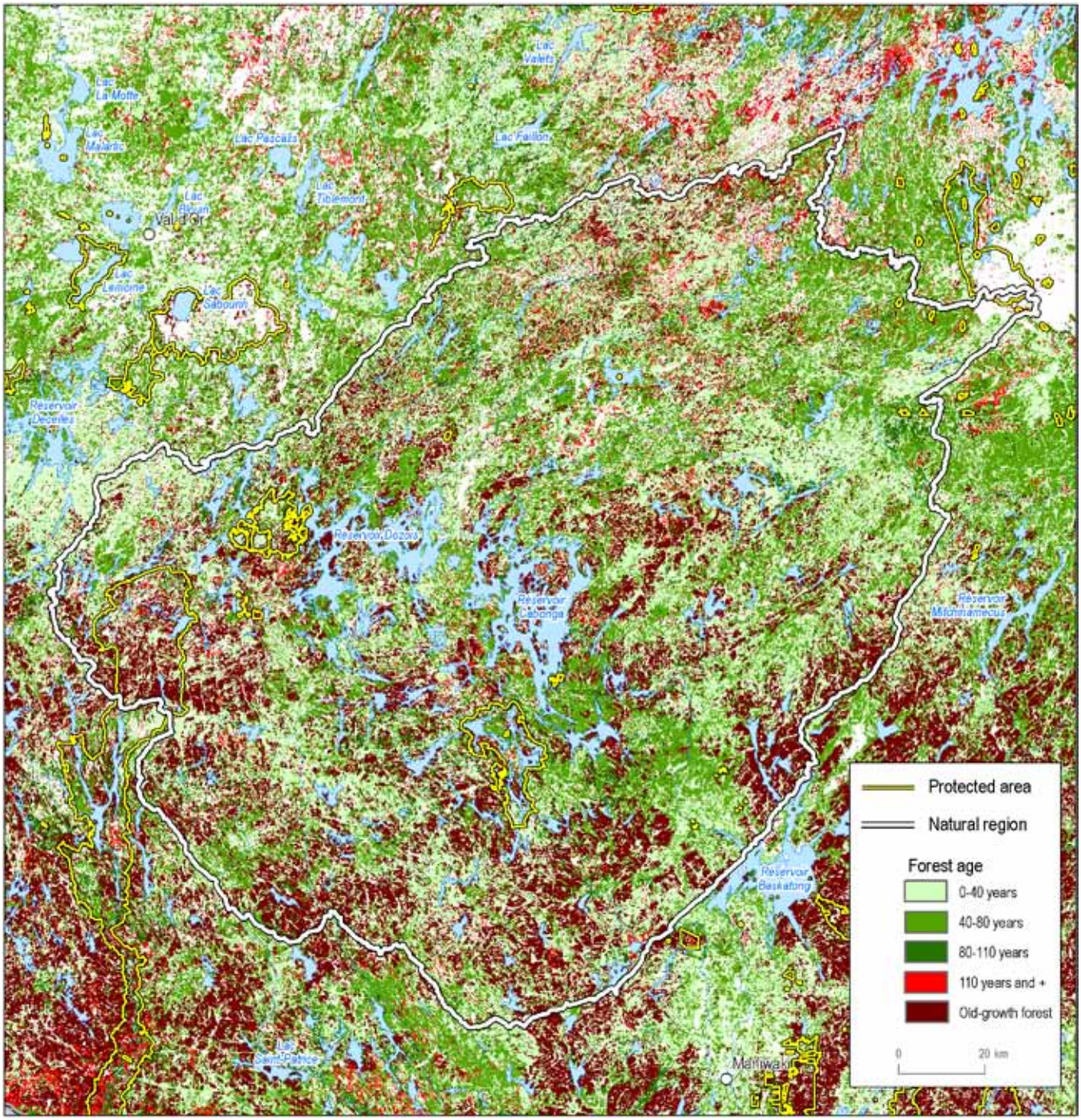


Table 14. Breakdown of forest stands by age class group – La Vérendrye Hillocks natural region

Age class group	Area of the natural region (km²)	Proportion of natural region (%)	Geographic size of the protected areas (km²)	% protected
Less than 40 years	7 524	35.2	236	3.1
Between 40 and 80 years	5 857	27.4	96	1.6
Between 80 and 120 years	1 373	6.4	49	3.6
120 years or over	6 595	30.9	357	5.4
Total	21 348	—	738	3.5

Figure 36. Age class groups of forest stands in the La Vérendrye Hillocks natural region



Old-growth forests appear to account for 36% of the forest cover but are proportionally more extensive in the protected areas, i.e. 58% of the protected forest cover (Figure 37). Some 5.7% of old-growth forests are protected, compared with 2.3% of younger forests.

The La Vérendrye Hillocks natural region hosts seven threatened or vulnerable wildlife species. Some 40 occurrences have been noted, of which only two are at least partially located in a protected area, i.e. two occurrences of the bald eagle noted in the Lac-Antostagan old-growth forest and in the Réserve aquatique projetée de la Rivière-Dumoine.

Figure 37. Location of old-growth forests in the La Vérendrye Hillocks natural region

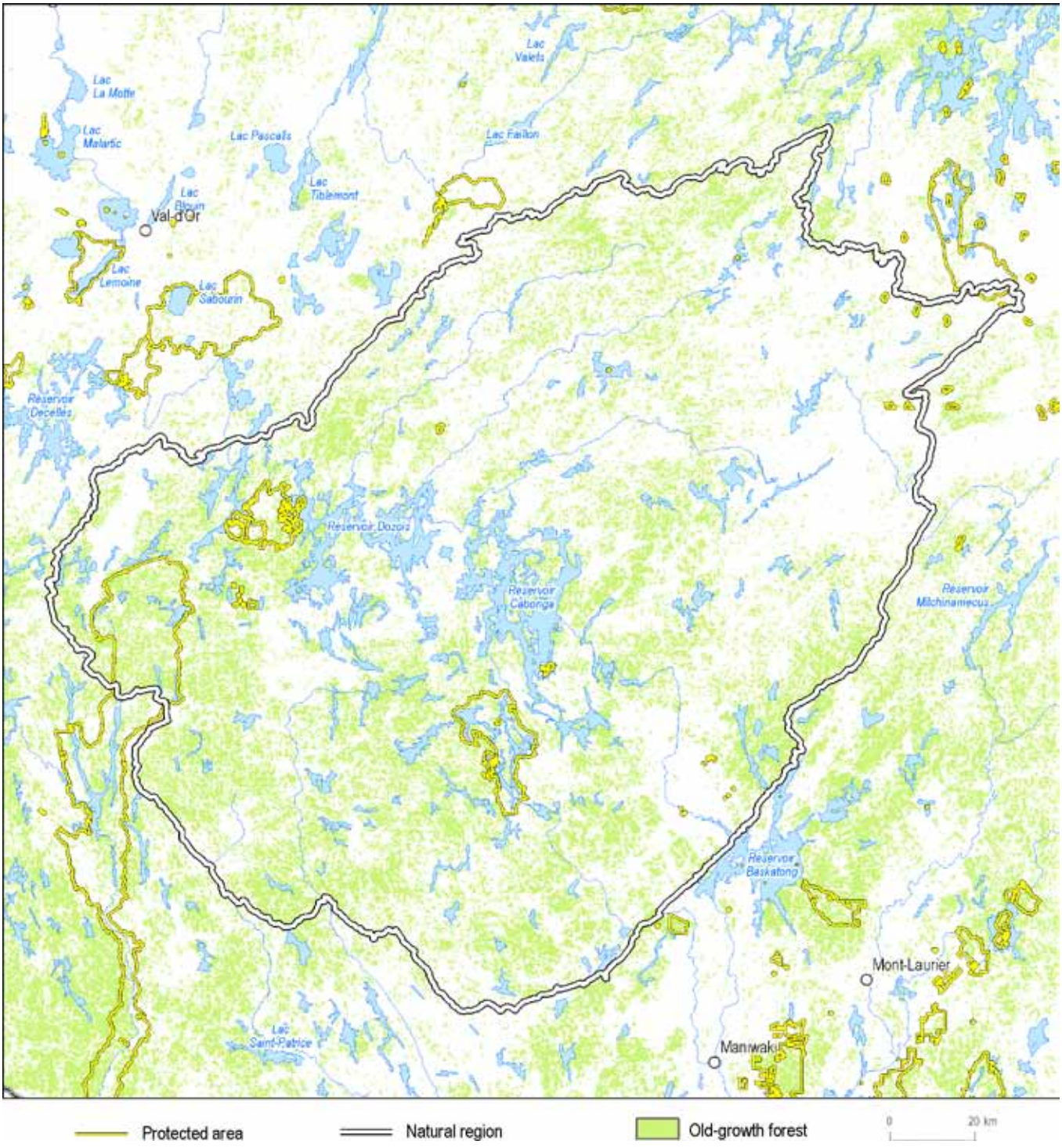


Figure 38. Representativeness of potential vegetation in the Dumoine Plateau natural region

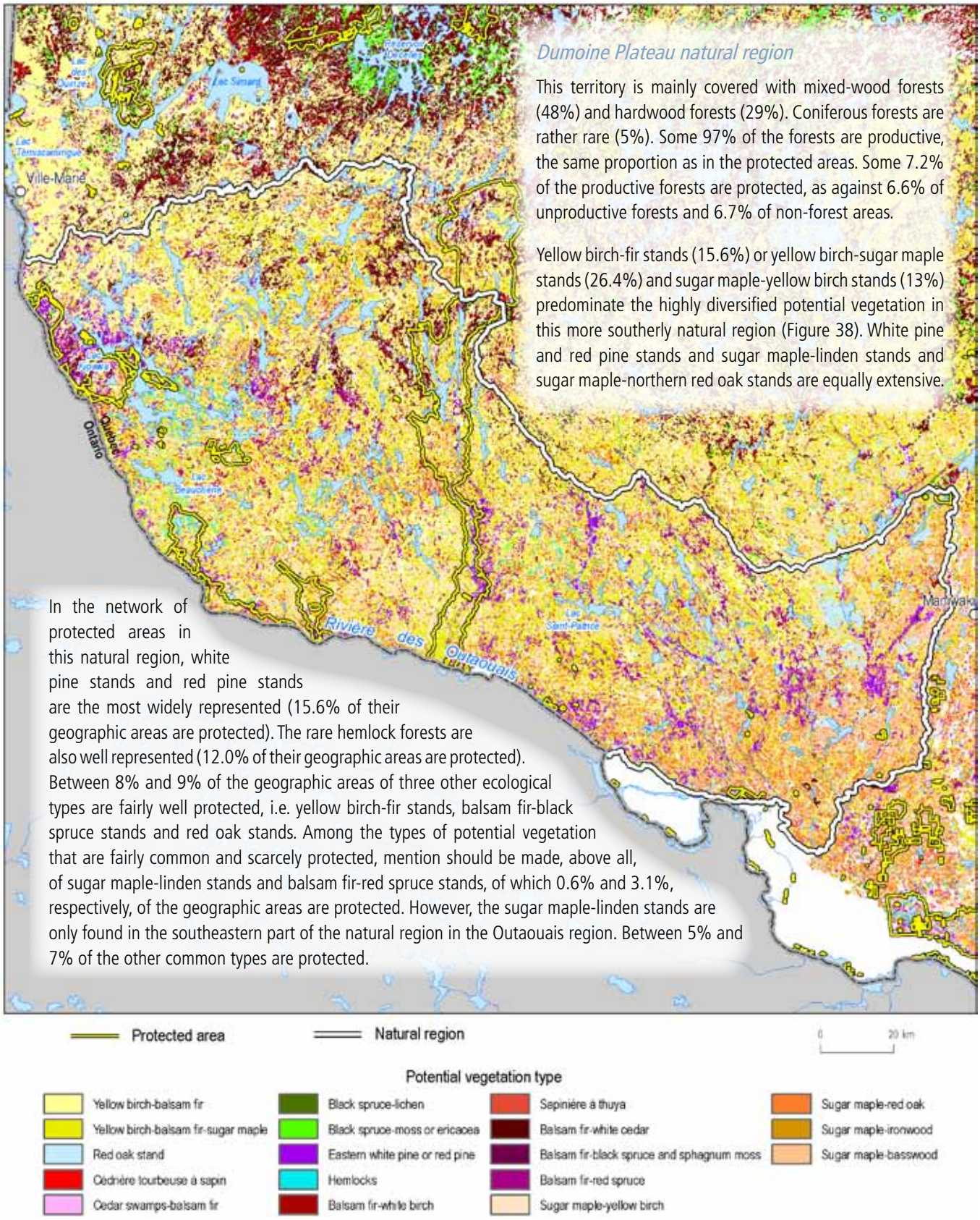
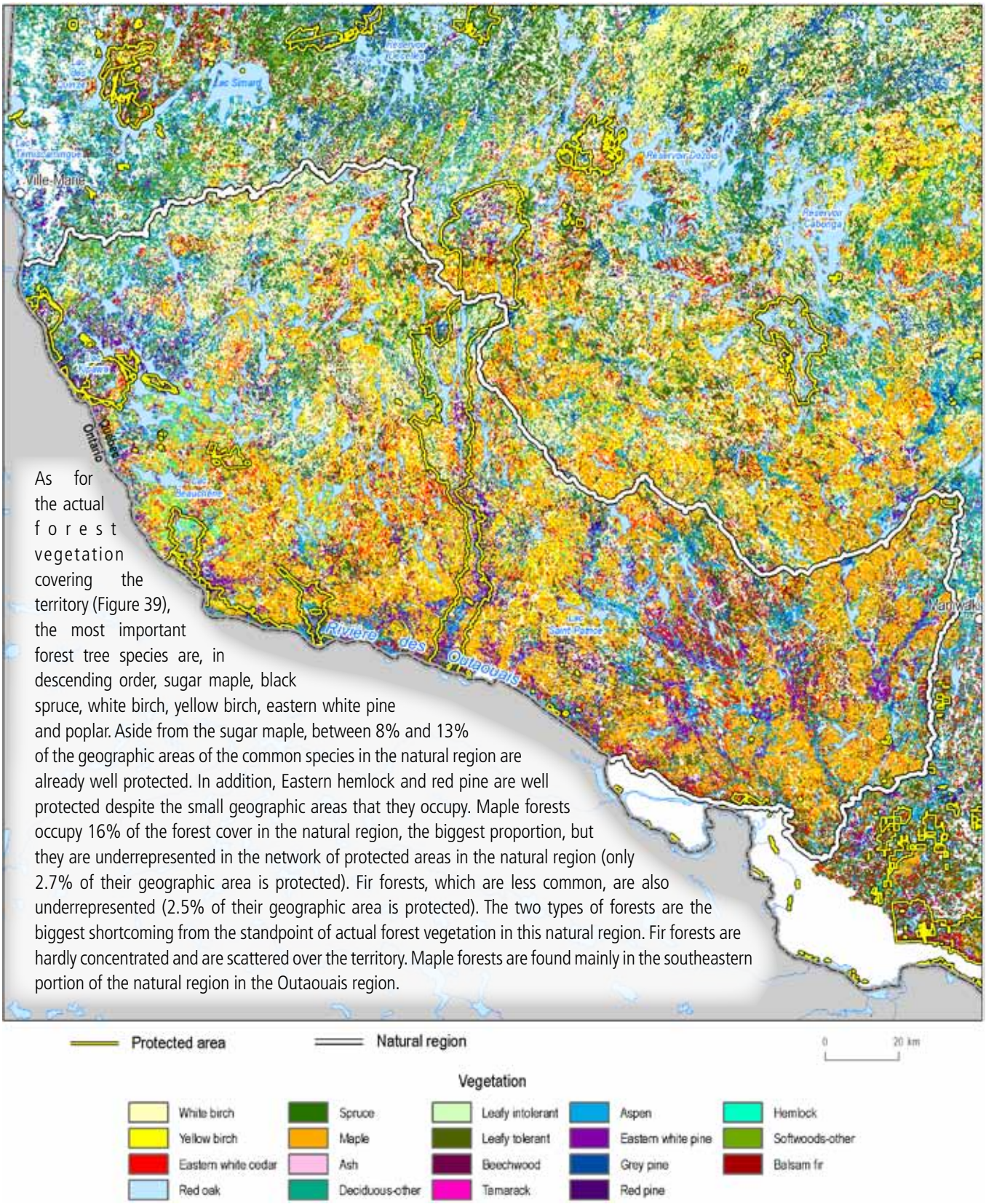


Figure 39. Tree species groups in the Dumoine Plateau natural region



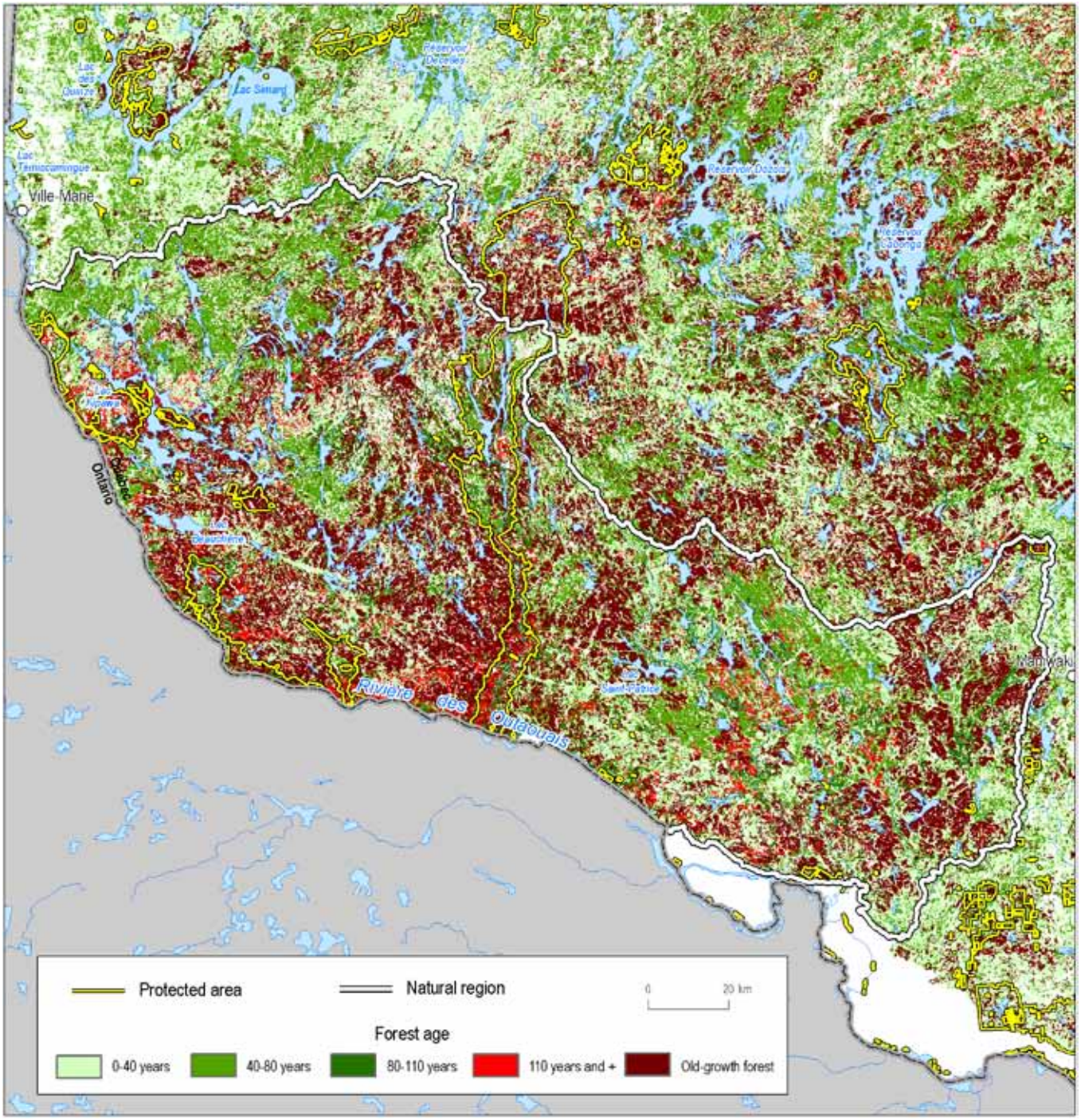
As for the actual forest vegetation covering the territory (Figure 39), the most important forest tree species are, in descending order, sugar maple, black spruce, white birch, yellow birch, eastern white pine and poplar. Aside from the sugar maple, between 8% and 13% of the geographic areas of the common species in the natural region are already well protected. In addition, Eastern hemlock and red pine are well protected despite the small geographic areas that they occupy. Maple forests occupy 16% of the forest cover in the natural region, the biggest proportion, but they are underrepresented in the network of protected areas in the natural region (only 2.7% of their geographic area is protected). Fir forests, which are less common, are also underrepresented (2.5% of their geographic area is protected). The two types of forests are the biggest shortcoming from the standpoint of actual forest vegetation in this natural region. Fir forests are hardly concentrated and are scattered over the territory. Maple forests are found mainly in the southeastern portion of the natural region in the Outaouais region.

The age structure of forest stands in the Dumoine Plateau natural region is distinctive (Figure 40). Generally speaking, hardwood stands are mainly old-growth forests while softwood stands are young or middle-aged (less than 80 years old). Forest stands between 80 and 110 years old are rather rare. It is noteworthy that the western portion of the natural region, located in the Témiscamingue region, has more old-growth forests.

Table 15. Breakdown of forest stands by age class group – Rivière Dumoine plateau

Age class group	% of the natural region	% protected
Less than 40 years	27.5	5.2
Between 40 and 80 years	21.2	5.1
Between 80 and 110 years	8.3	13.7
110 years or over	43.0	8.5

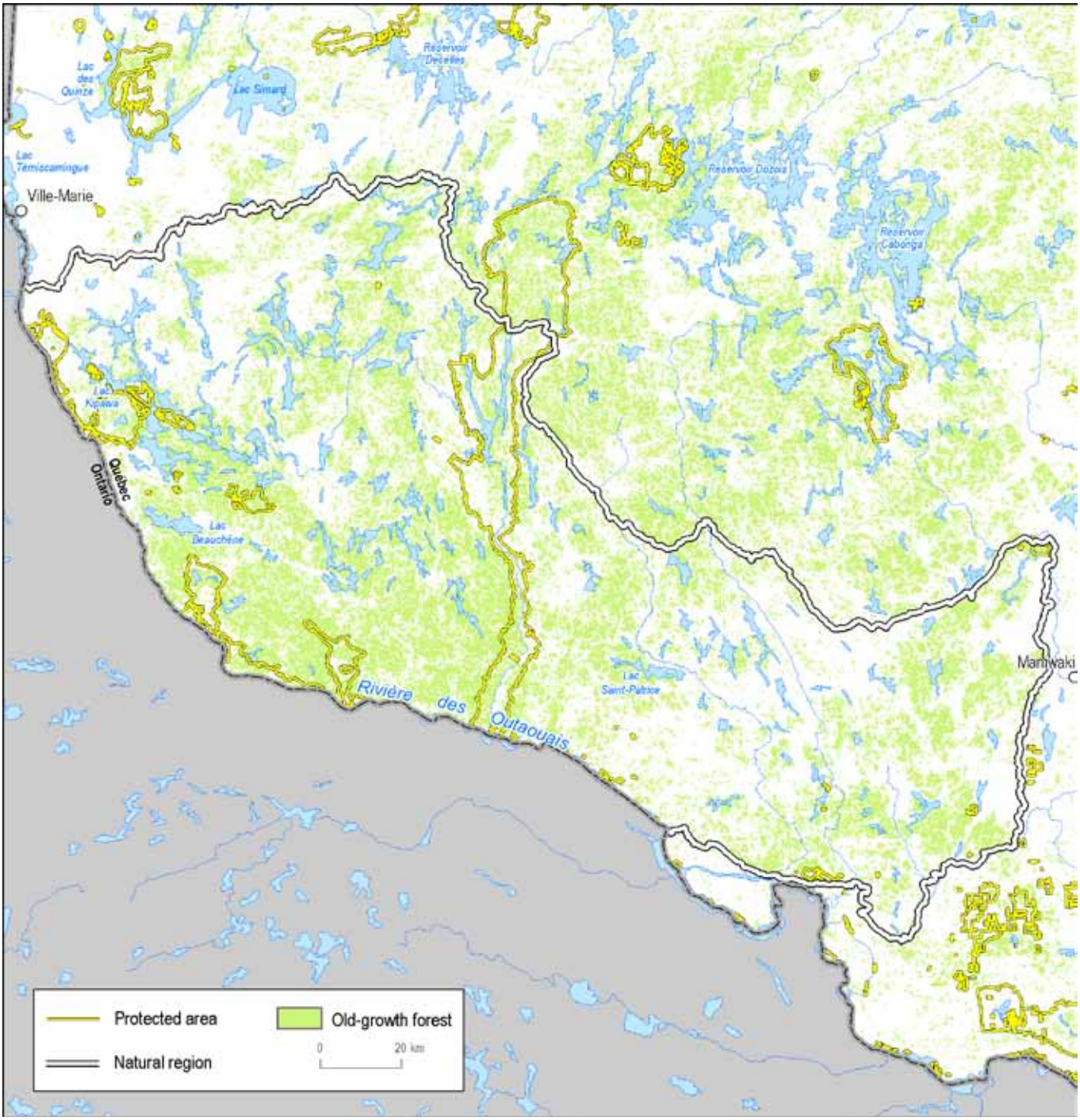
Figure 40. Age class groups of forest stands in the Dumoine Plateau natural region



Old-growth forests account for nearly 44% of forest cover in the natural region but they make up 50% of the protected forest cover (Figure 41). The proportion of protected old-growth forest is 8.4%, compared with 6.4% for younger forests.

The Dumoine Plateau natural region hosts 44 threatened or vulnerable species, i.e. 34 plant species and 10 animal species. Some 122 occurrences have been noted, of which 42 are at least partially located in a protected area. This affords 27 species minimal protection, i.e. 22 plants, one reptile, two birds and two mammals. The territory of the proposed Parc national d'Opémican and the Forêt refuge du Rocher-à-l'Oiseau host the greatest number of threatened or vulnerable species (10 in both cases). The exceptional forest ecosystems classified in this natural region jointly host 19 threatened or vulnerable species.

Figure 41. Location of old-growth forests in the Dumoine Plateau natural region



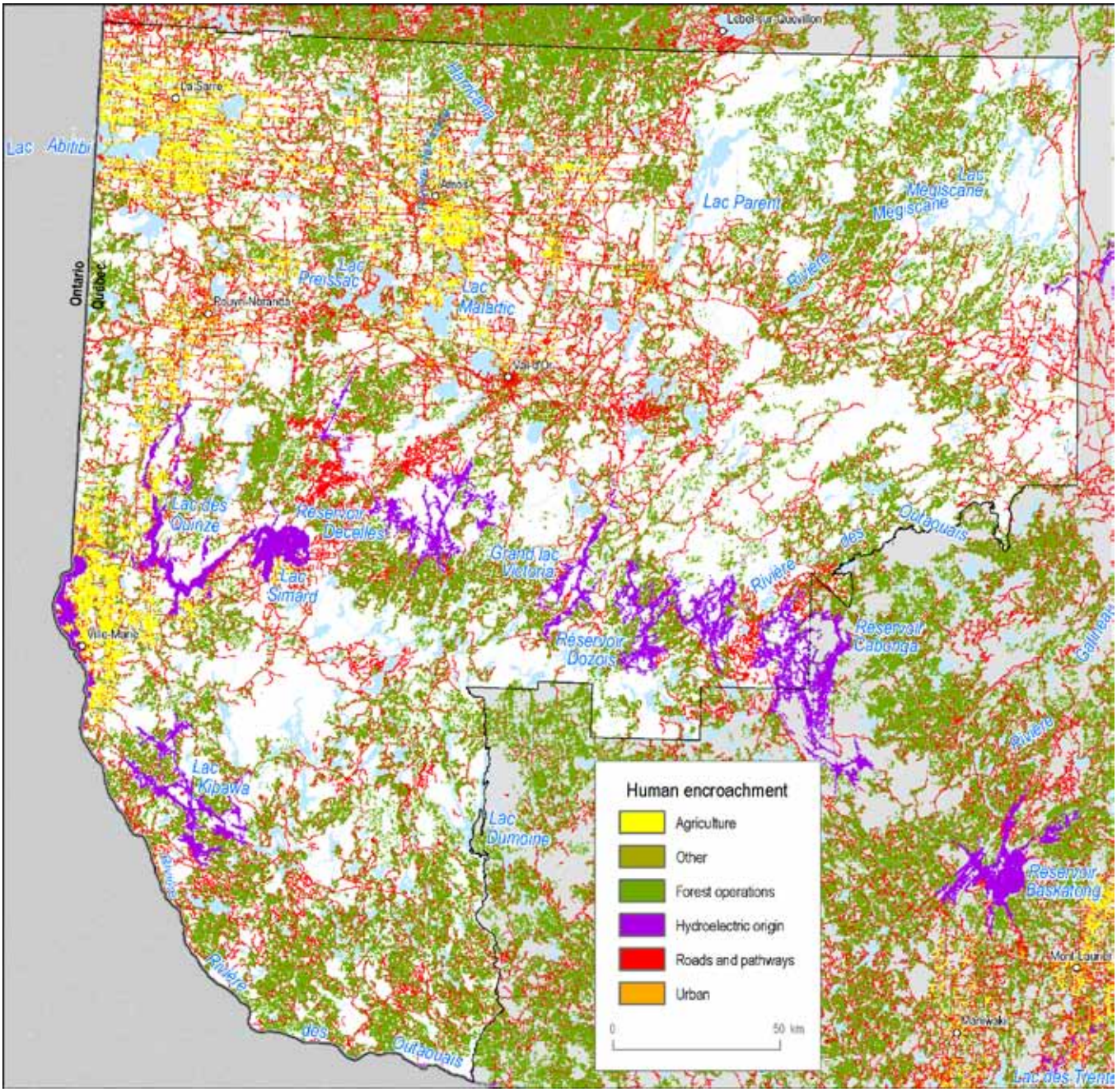
3.6.4 Efficacy of the network

Human footprint and naturality

The MDDEP is seeking, as far as possible, to protect territories in which the level of human disturbance is low and, therefore, where the level of naturality[7] is high. While it seems difficult to find vast territories that have never been disturbed, in particular in the Abitibi-Témiscamingue region, it is, however, possible to compare the level of disturbance in the protected territories in relation to the level of disturbance in a bigger reference territory, e.g. a natural region. In this instance, we evaluated the extent of the human footprint in the protected areas in the Abitibi-Témiscamingue region and compared it with the average human footprint in all of the natural regions concerned in the Abitibi-Témiscamingue administrative region. Human disturbances can be divided into six categories, i.e. agriculture, logging operations, hydroelectricity, highways and roads, the urban environment, and other disturbances. Accordingly, 70% of the geographic area of the network of protected areas in the

[7] The concept of naturality can refer to the concept of wilderness in the United States. Essentially, a territory displays high naturality if its ecological integrity is high and the human footprint is small. The human footprint is defined as any form of trace left by human beings while an ecologically intact territory should display characteristics similar to a pre-Columbian forest never disturbed by human beings

Figure 42. The human footprint in the Abitibi-Témiscamingue region



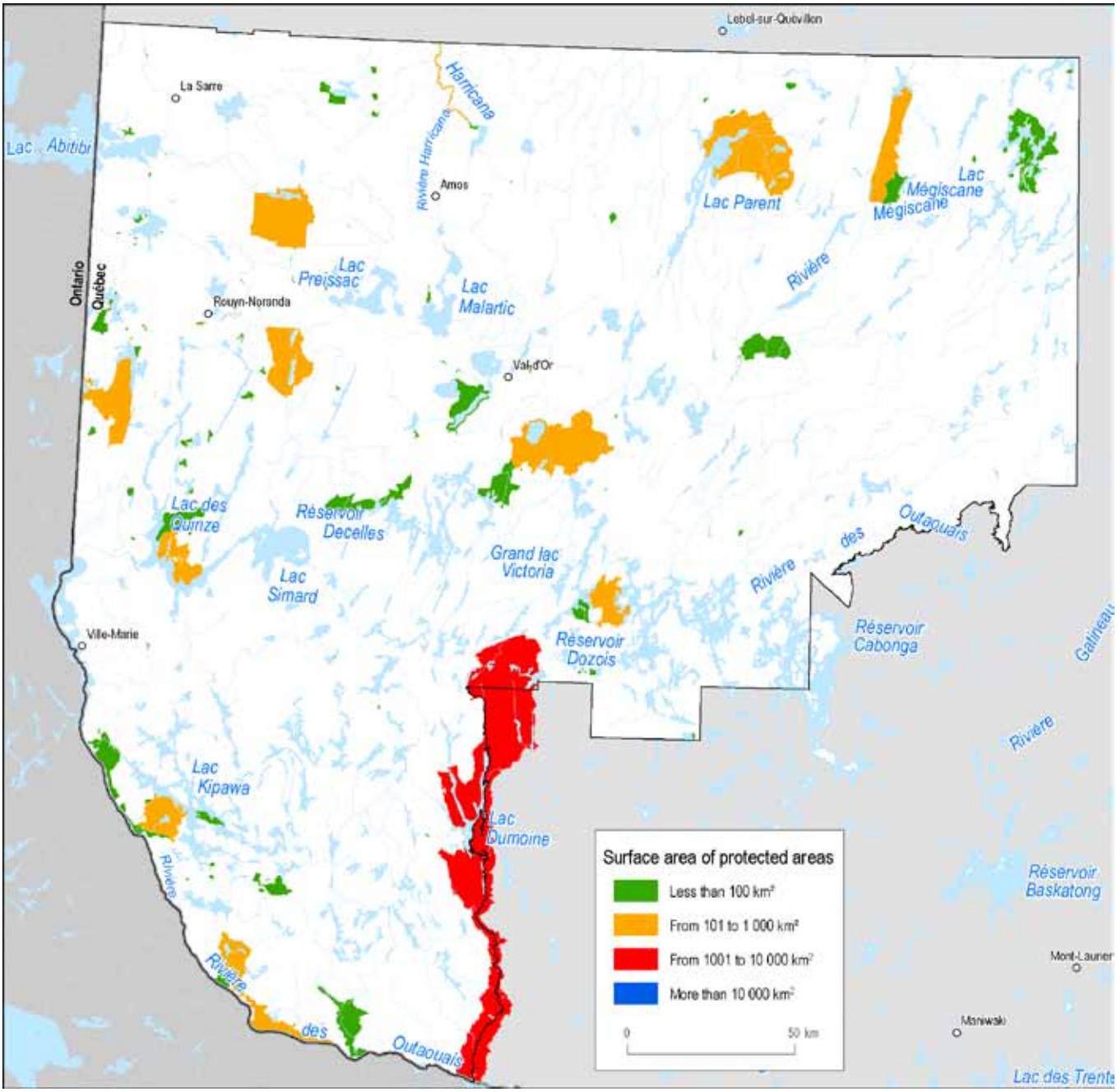
Abitibi-Témiscamingue region is human footprint-free, compared with 56% in the five reference natural regions (Figure 42).area of the network of protected areas in the Abitibi-Témiscamingue region is human footprint-free, compared with 56% in the five reference natural regions (Figure 42).

However, it should be noted that certain protected areas in the region display traces of extensive previous logging. This is true of the Réserve de biodiversité projetée de l'Esker-Mistaouac, the Réserve de biodiversité projetée des marais du lac Parent (eastern portion) and the Réserve de biodiversité projetée du lac Wetetnagami, and of certain sectors of the Réserve aquatique projetée de la Rivière-Dumoine. The eight protected areas covered by the consultation display a level of naturality similar to that in the network of protected areas, i.e. 69% of the geographic area is human footprint-free.

Area

From the standpoint of the size of the protected areas, the Abitibi-Témiscamingue region has only one protected area over 1 000 km^2, i.e. the Réserve aquatique projetée de la Rivière-Dumoine. Twelve protected areas cover between 100 km^2 and 500 km^2; eight, between 20 km^2 and 100 km^2; 56, between 1 km^2 and 10 km^2, and

Figure 43. Size of the conservation cores in the Abitibi-Témiscamingue region



the remainder, roughly half of the protected areas, less than1 km² (Figure 43). For such a territory that is subject to numerous constraints stemming from human activities, this breakdown is fairly well balanced.

In the southern portion of the region, mainly in the Témiscamingue region, the protected areas are bigger than the average area of the most recurrent fires. Farther north, the protected areas are smaller than the average area of the most recurrent fires, occasionally much smaller (Figure 44). However, it is essential to consider that the average area of fires in the south is roughly 1 km² and that in the northern portion of the region, they can regularly exceed 500 km².

Configuration

From the standpoint of configuration, the ideal protected area must be round in order to maintain the perimeter-area ratio as low as possible and thereby limit the edge effect.[8] This rule is important to ensure the protection of adequate habitats for species (behaviour, movement and migration). The following chart illustrates the curve of the perimeter-area ratio according to the reference area of the circle. We have also indicated the perimeter-area ratio of the biggest

[8] Edge effect: The adverse impact of artificial edges created in biophysical environments. For example, it can be said that the edge effect and thus the adverse impact of human activities in the vicinity of a protected area might be felt up to 3 km inside the boundaries of the protected area

Figure 44. Protected areas and average size of the most frequent forest fires

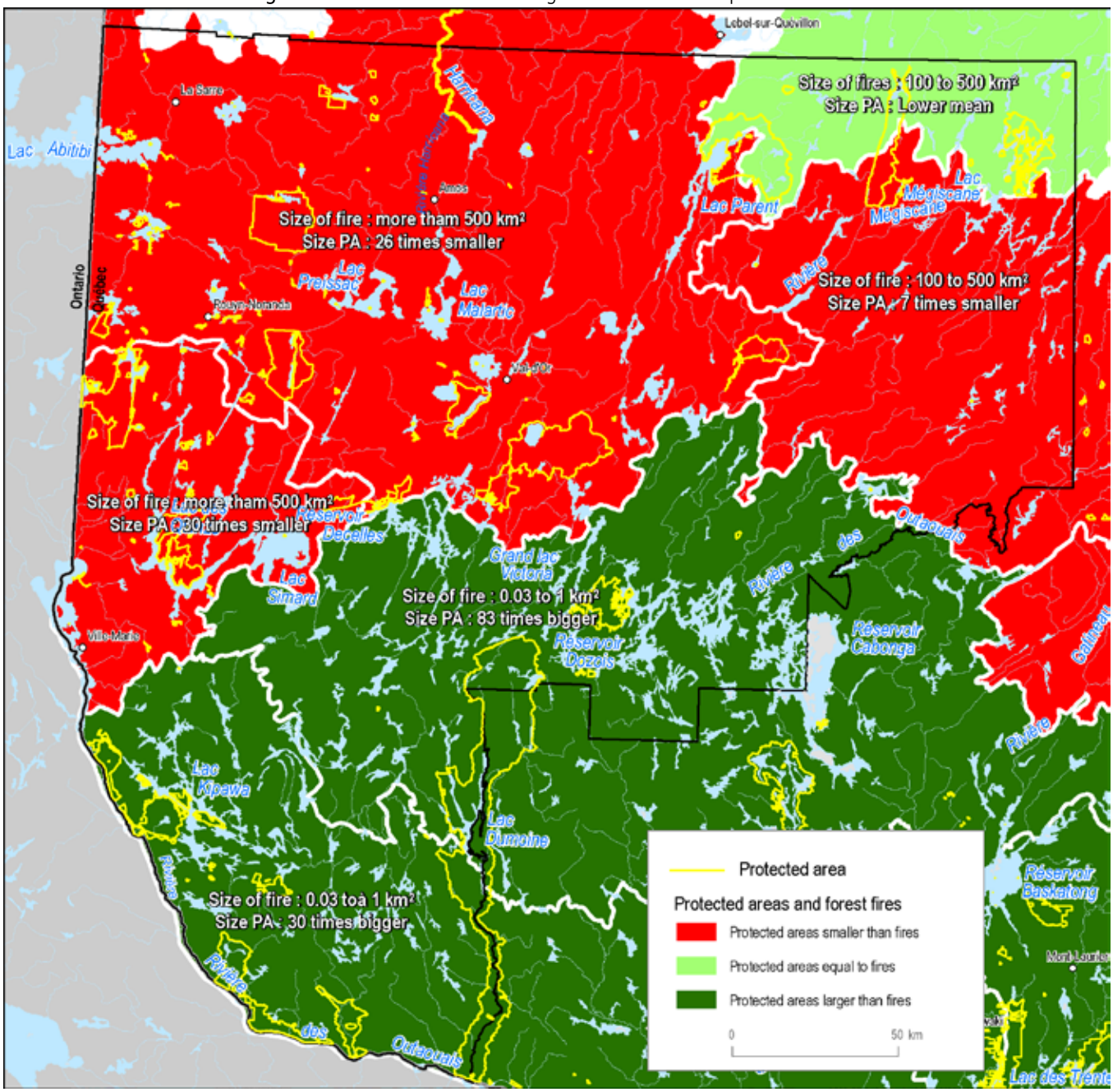
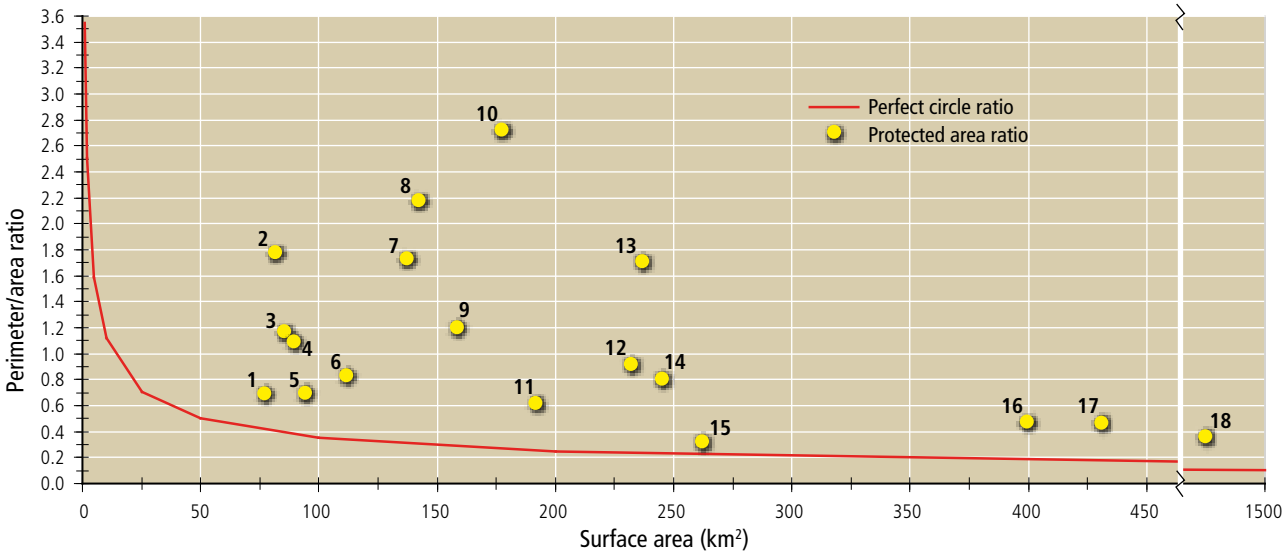


Figure 45. Perimeter-area ratio of the biggest protected areas in the Abitibi-Témiscamingue region



protected areas in the Abitibi-Témiscamingue region on the same chart (see the list in Table 16).

Table 16. Perimeter-area ratio of the biggest protected areas in the Abitibi-Témiscamingue region

No	Protected area	Ratio
1	**Réserve de biodiversité projetée des Dunes-de-la-Rivière-Attic**	0.7
2	Réserve de biodiversité projetée du réservoir Decelles	1.8
3	Aire de confinement du cerf de Virginie Mattawa	1.2
4	**Réserve de biodiversité projetée de la Vallée-de-la-Rivière-Maganasipi**	1.1
5	Réserve de biodiversité projetée de la forêt Piché-Lemoine	0.7
6	**Réserve de biodiversité projetée des Basses-Collines-du-Ruisseau-Serpent**	0.8
7	**Réserve de biodiversité projetée Wanaki**	1.7
8	**Réserve de biodiversité projetée du lac Saint-Cyr**	2.2
9	Réserve de biodiversité projetée du lac des Quinze	1.2
10	Réserve aquatique projetée de la haute Harricana	2.7
11	Réserve de biodiversité des Lacs-Vaudray-et-Joannès	0.6
12	**Réserve de biodiversité projetée du lac Wetetnagami**	0.9
13	Réserve de biodiversité projetée Opémican	1.7
14	Réserve de biodiversité projetée du lac Opasatica	0.8
15	Parc national d'Aiguebelle	0.3
16	**Réserve de biodiversité projetée du marais du lac Parent**	0.5
17	Réserve de biodiversité des Caribous-de-Val-d'Or	0.5
18	**Réserve aquatique projetée de la Rivière-Dumoine**	0.4

* The protected areas in bold face are subject to the public consultation.

It is noteworthy that several protected areas are fairly close to the ideal curve, in particular the Rivière-Dumoine, marais du lac Parent, Caribous-de-Val-d'Or, Lacs-Vaudray-et-Joannès, forêt Piché-Lemoine and Dunes-de-la-Rivière-Attic reserves, and the Parc national d'Aiguebelle. The protected area farthest removed from the ideal curve is the Réserve aquatique projetée de la haute Harricana, which is intended to protect the bed and the banks of a very long river. It therefore has a longilineal profile. To this end, it should be noted that the specific protection objective of a territory means that a round shape is not always the best one. It is in the case of terrestrial species habitats but not as regards aquatic environments. Moreover, if we wish to protect a specific plant or wildlife habitat, it may be preferable to ensure the inclusion of all of the habitat in question even if the habitat shape is far from circular.

Moreover, from the standpoint of the types of physical environments, the more a protected area corresponds to the natural boundaries of the ecosystems that it protects, the more effective it will be in maintaining its ecological integrity. Accordingly, at a given scale pertaining to a given protected area, ecological mapping such as developed for the ecological reference framework is an appropriate tool to delineate the ecosystems covered by a protected area and to determine the ideal boundaries for the protected area according to the actual boundaries of the ecosystems. However, in this instance, it is not possible to produce comparative data, as is the case with a circle. A cursory analysis of the efficacy of the boundaries of the eight protected areas covered by this consultation will be carried out in the sections devoted to each of the protected areas in this information document. The determination of the natural boundaries of the ecosystems has been used to evaluate the theoretical expansions to the protected areas intended primarily to protect terrestrial ecosystems based on the representativeness of the physical features.

Aquatic ecosystem and drainage basin

The efficacy of a protected area can also be measured by the protection of its drainage basin. Certain protected areas seek, among other things, to protect rivers, lakes and large water bodies. To ensure the protection of these lotic and lentic environments, it is essential to protect the drainage basin that receives runoff that sustains the environments, mainly the minimum drainage basin[9] (Figure 46). The boundaries of certain protected areas in the Abitibi-Témiscamingue region are based on the ordinary high water mark of a water body or a watercourse. When the watercourse or the water body is one of the protection components targeted by the protected area, such boundaries are inappropriate from an ecological standpoint. However, when the elements of the terrestrial environment are targeted, the boundaries based on the ordinary high water mark may be less problematical from the standpoint of ecological integrity.

Since drainage basins are often very big in geographic area and it is rarely possible to include them integrally in a protected area, the determination of the minimum drainage basins has been used to evaluate the potential expansions to the protected areas intended primarily to protect aquatic ecosystems. A minimum drainage basin corresponds to the drainage unit that flows toward a water body located downstream and is limited upstream to the highest point of the basin or the discharge of a lake that would act as a debris basin.

Figure 46. Concept of a minimum drainage basin

Visual landscape

The protection of landscapes also poses a challenge regarding the efficacy of the network when the natural landscapes in the territory of a protected area are used for recreational purposes. Accordingly, from a social, cultural and recreational viewpoint, the protection of a territory's visual landscapes, in particular from the standpoint of the activities carried on there, will be of particular importance that must be considered. The aquatic reserves and biodiversity reserves in the Abitibi-Témiscamingue region have usually been established and configured according to ecological criteria, bearing in mind society's wishes and economic constraints. The protection of the visual landscape has not specifically been taken into account. To determine the permanent boundaries of the proposed reserves covered by this consultation, concern will be accorded the protection of visual landscapes in the territories where this consideration is applicable. This is true, in particular, of the Lac Wetetnagami, Lac Saint-Cyr, Vallée-de-la-Rivière-Maganasipi and Rivière-Dumoine reserves that focus on wildlife development and, notably as regards the Rivière Dumoine, recreational development.

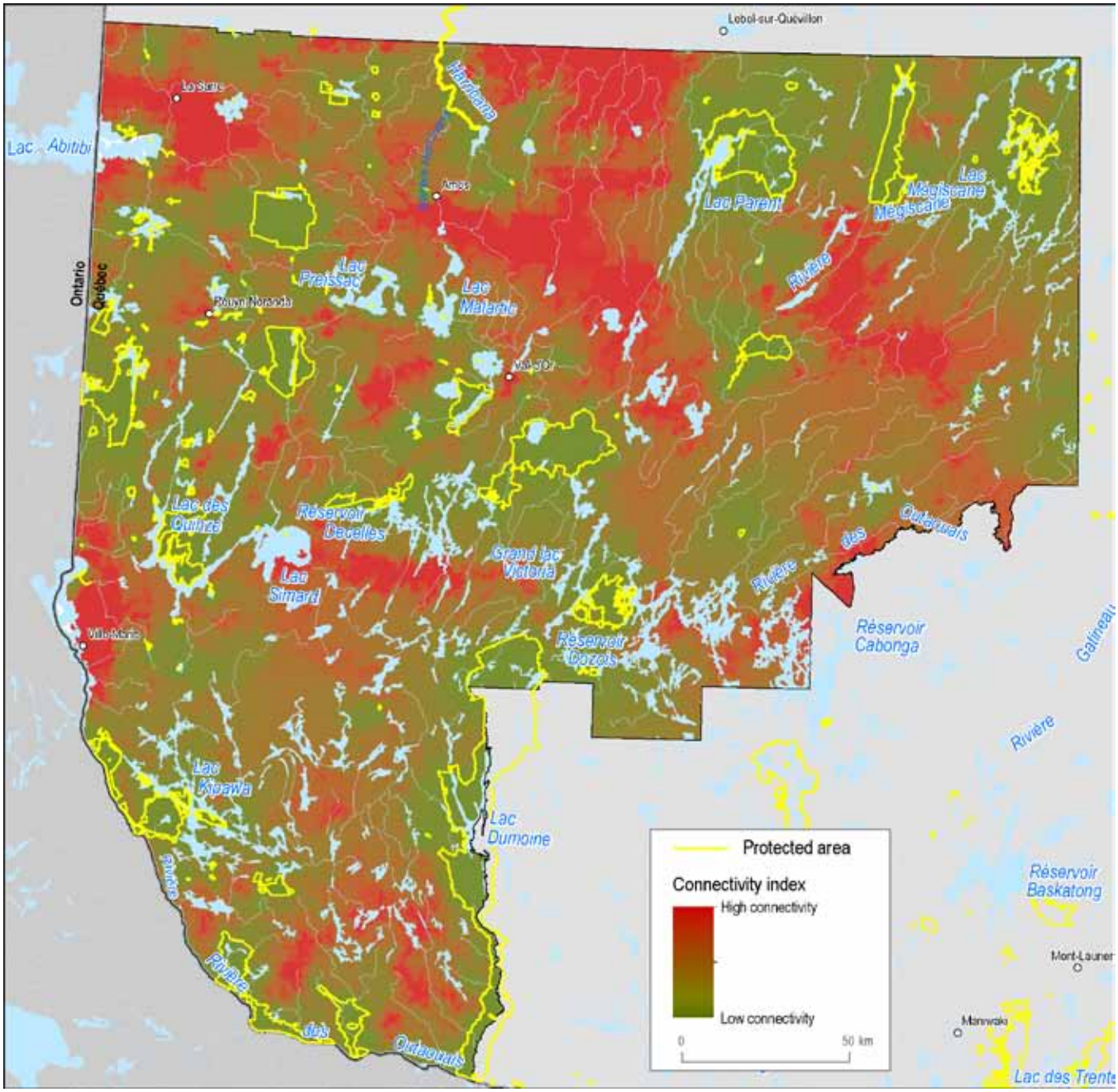
Connectivity

Connectivity between the protected areas is also important to ensure the network's ability to preserve biodiversity. When a territory located between two habitats, for example two protected areas, displays high connectivity, this means that the territory offers characteristics that promote smooth, efficient movement by wildlife or plant species between the two protected areas. Corridors can allow for the movement of plant and animal communities between two habitats, e.g. two wolf packs, two bird colonies or two plant communities. Connectivity avoids isolating a protected area and thereby making it vulnerable. In the long term, it allows for better maintenance of the properties of the protected areas, particularly by fostering sources of recolonization after disturbances. Good connectivity will facilitate migrations and promote adaptation to climate change and natural disturbances. The analysis of connectivity hinges on the presence of elements that can hamper the movements of organisms, such as highways, roads, trails, homes, and so on. Depending on the species studied from the perspective of their ability to move about, cutting areas and agri-environments but also, in certain cases, lakes and watercourses, will act as barriers to movement. The distance between the protected areas is also a variable that affects the degree of connectivity.

Figure 47 shows that in the Abitibi-Témiscamingue region the connectivity between protected areas is generally high. Since this is an important factor in conservation, special attention should be paid to maintaining such connectivity. Certain less strict types of status as protected areas could possibly be used to maintain or bolster the connectivity between existing protected areas. The maintenance of the connectivity between protected areas also stems from land-use planning and forest development planning in the unprotected domain of the State that takes into consideration the needs of different species to move about. In short, connectivity does not depend solely on protected areas.

[9] This term defines the drainage units directly related to the watercourse or to the water body, compared with the entire drainage basin. For example, the minimum drainage basin of the Rivière Dumoine has an area of 1 693 km^2 while its complete drainage basin has an area of 4 309 km^2. It should be noted that there is no recognized, accepted term to define the concept of a drainage unit directly related to a watercourse or a water body. The author has chosen the expression «minimum drainage basin» in this information document.

Figure 47. Connectivity between the network of protected areas in the Abitibi-Témiscamingue region



3.6.5 Main shortcomings of the network in the Abitibi-Témiscamingue region

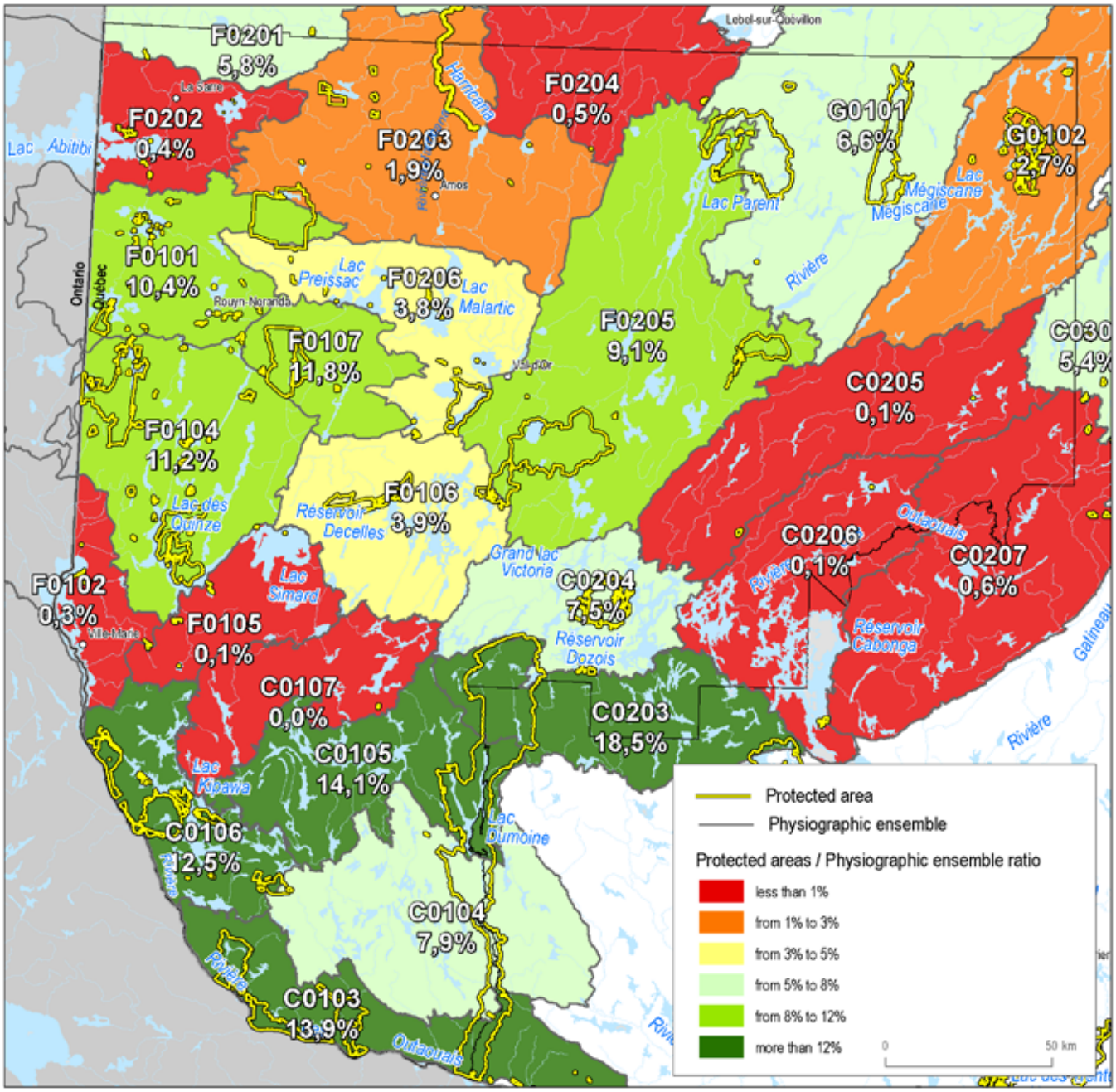
This section presents the main shortcomings noted in the network of protected areas in the Abitibi-Témiscamingue region.

Figure 48 illustrates the proportions of protected areas for each of the physiographic units included in the five natural regions in the Abitibi-Témiscamingue administrative region.

From the standpoint of physical representativeness:

- The near total absence of protected areas in physiographic unit F01012 located near Ville-Marie, attributable to private ownership in urban environments and agri-environments covering almost the entire territory.
- The absence and near total absence of protected areas in physiographic units C0107 and F0105 located between the head of the Rivière Dumoine and Ville-Marie, partly

Figure 48. Proportion of protected areas by physiographic unit



attributable to the presence of mineral potential at the time of deliberations on the development of the network of protected areas.

- The near total absence of protected areas in physiographic units F0202, F0203 and F0204 located on the La Sarre – Amos – Lebel-sur-Quévillon axis. The first physiographic unit almost entirely comprises private lands, mainly used for farming. The three physiographic units are also covered by numerous active mining rights.
- The near total absence of protected areas in physiographic units C0206 and C0207 located east of the Réserve faunique de La Vérendrye. There are no private lands in the territories and few active mining rights.

More detailed information on the shortcomings of each natural region concerned in the Abitibi-Témiscamingue region is presented in the document entitled "Portrait du réseau d'aires protégées au Québec – Analyse de carence écorégionale – Région administrative de l'Abitibi-Témiscamingue."

From the standpoint of biological representativeness (see Figures 12 and 13), shortcomings have been noted with respect to:

- potential maple forests in the southern portion of the Témiscamingue region;
- potential yellow birch stands, fir forests and spruce stands and old-growth forests and productive forest environments located in the big sector south of the Réserve des Dunes-de-la-Rivière-Attic;
- potential yellow birch stands, fir forests and spruce stands in the Ville-Marie – Rouyn-Noranda – Val-d'Or triangle;
- potential fir forests and spruce stands and productive forest environments in the area surrounding La Sarre, Amos, Lebel-sur-Quévillon, Senneterre and Val-d'Or;
- potential fir forests and spruce stands and old-growth forests and productive forest environments east of Senneterre.

From the standpoint of the efficacy of the network of protected areas in the Abitibi-Témiscamingue region, special attention should be paid to:

- the size of the protected areas, above all in the northern portion of the Abitibi-Témiscamingue region where the fire regime corresponds to forest fires with a big geographic area;
- the shape of certain protected areas in order to minimize the edge effect or, as the case may be, to aim for the natural boundaries of ecosystems as mapped by the ecological reference framework;
- the protection of the minimum drainage basins of the main lakes included in the protected area;
- the protection of recreational or tourism landscapes in certain protected areas;
- the connectivity between the protected areas;
- the maintenance or the enhancement of the proportions of territory that are human footprint-free in the network of protected areas.