

Master Plan



Parc national des Pingualuit

**Développement durable,
Environnement
et Parcs**

Québec 

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ACKNOWLEDGEMENT

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Note to readers

Since creation of the *parc national des Pingualuit* in January 2004, responsibility for the parks has been shifted from the *Société de la faune et des parcs du Québec* to the *ministère des Ressources naturelles, de la Faune et des Parcs du Québec* in June 2004 and to the *ministère du Développement durable, de l'Environnement et des Parcs* in February 2005. Thus, the elements of the *Société's* strategic planning and the engagements made with respect to parks have been integrated into the *Ministère* strategy plan. Furthermore, the position taken by the *Société* following public hearings for the *parc des Pingualuit* will be maintained by the *Ministère*. In conclusion, it is vital to stipulate that the conditions associated with the authorization certificate issued by the *ministère de l'Environnement* and the terms of the agreement executed between the Kativik Regional Government (KRG) and the *Société de la faune et des parcs du Québec* on the *parc des Pingualuit* will be respected by the *Ministère*.





Foreword

With adoption of the *Parks Act* (R.S.Q., c. P-9) in 1977, Québec could thereafter pride itself, alongside most of the Western countries, on being equipped to form a fully fledged system of national parks on its territory. One should bear in mind that the parks are dedicated first and foremost to protection of Québec's natural heritage for the benefit and satisfaction of present and future generations. This means each component of the parks system is protected against commercial and industrial tapping of forest, mining, and energy resources and that the transition of oil and gas pipelines and power lines is forbidden there. The purpose of these measures is to prevent all forms of erosion of the natural environment, except for erosion having occurred prior to park creation.

Since the *Earth Summit* (UN Conference on Environment and Development) held in Rio de Janeiro in 1992, more than 175 States, including Canada, signed and ratified the *Convention on Biological Diversity*¹. The Québec government is responsible for implementing this agreement throughout its territory. This constitutes an additional incentive to create new parks, for such action constitute an ideal manner for the government to follow through on its commitment to sustainable development. Furthermore, Québec has made public its strategy for application of the Convention on *Biological Diversity* in addition to a pertaining action plan in 1996. In July 2000, it adopted a new orientation framework to devise a strategy aimed both at attaining a protected surface area in the vicinity of 8% by the end of March 2007, and at protecting its whole *biological diversity*.

The 2001-2004 strategic planning of the *Société de la faune et des parcs du Québec* focused the development and management of the parks on conservation, while also fostering activities based on discovery of natural and cultural heritage. To this effect, revision of the parks Policy and modification of the *Parks Act* (R.S.Q., c. P-9) reaffirm the priority of the objective of conservation and the importance of establishing indicators to enable its evolution to be monitored.

This strategic planning underling the intentions of the *Société de la faune et des parcs du Québec* to create Northern parks was supported by the signature on April 9, 2002, of a partnership agreement on economic and community development in Nunavik. The agreement stipulates that parks will be created to develop tourism in this region. It was followed on June 13 of the same year by the signing of an agreement tailored to the development of parks in Nunavik, which signifies that in addition to the *parc national des Pingualuit*, four more projects will be put forward by 2007.

1. Words or expressions in boldface and italics are defined in a glossary at the end of this document.



1 Introduction

At the Northern end of Québec, on the most elevated lands of Ungava, stretches a fascinating lake, the Lake Pingualuk. Nestled at the heart of the Pingualuit² Crater, it is perfectly circular and boasts water so clear that it has practically no equal on earth. Older than a million years, its walls, its depths, and its crystalline waters gradually open up the secrets of its origin. Hence, it is easy to understand the interest that the Pingualuit Crater has sparked in the scientific community since its relatively recent “discovery”.

The crater is nestled in a rocky plateau carved by countless oblong jagged-shaped lakes. The sharp geographic features resulting from this meteor contrast sharply with the surrounding soft relief and tiny vegetation often wrongfully described as nonexistent. Wind and rain prevail over this rocky universe that springs to life during a brief Summer with its interminably long days.

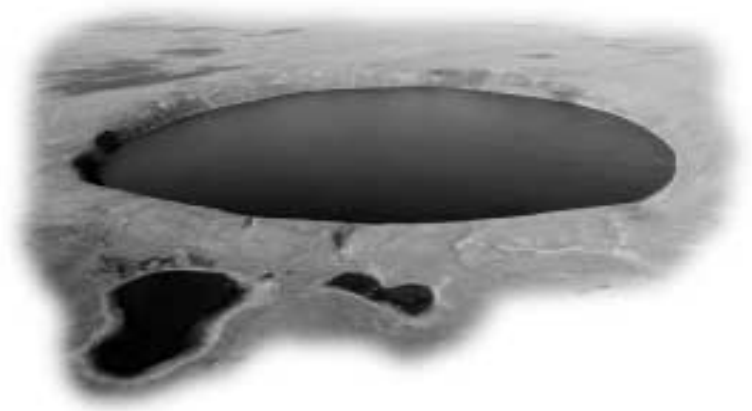
At once fragile, isolated, and inhospitable, the *parc national des Pingualuit*, 22nd among Québec’s national parks, is meant for people sensitive to its exceptional character and those who crave pure nature. Creation of this Park also pays tribute to all those who could recognize the value of the Pingualuit Crater, appreciate its vulnerability, and take action to foster its protection. This tribute is particularly addressed to the Inuit community of Kangiqsujuaq which, entirely aware of the richness of its natural heritage, has acted as custodian of this heritage, for our benefit and for that of future generations.

1.1

The purpose of creation of the park

The Québec government has created the *parc national des Pingualuit* with a view to protecting one of Québec’s exceptional and internationally acclaimed sites. In fact, the Pingualuit Crater lays claim to uniqueness as much for its sharp profile, as for its geological youth and the crystalline purity of the waters it cradles. In addition, this Park includes a representative sampling of the Ungava Plateau (B-39): this immense natural region, with a surface area of 224,000 km², covers almost the entire peninsula from which it takes its name (see map 1).

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This plateau with an average altitude of 300 m is characterized by rolling hills and a multitude of lakes. Mostly formed by ancient rocks, it is practically denuded, except at its Southern margin marked by the end of the forest tundra. It is further characterized by the presence of continuous *permafrost*. As for wildlife, it is the procession of typically Nordic species, such as caribou herds, the arctic fox, polar bear, snowy owl, Arctic charr, and a host of others.

2. Inuktitut word referring to high mountains surrounded by a flat region.

In this context, the *parc national des Pingualuit* combines nordicity, immensity, and wilderness, advantages associated with Ungava. Only its distinctly continental location can deprive it from being considered representative of the typically coastal dimension. This latter dimension will find its echo in other Northern park projects that the Québec government intends to create over the short term, notably in the Puvirnituq heights region, where lands are reserved for this purpose.

- 12 Creation of the *parc national des Pingualuit* will as well, enable the Québec government to meet one of its obligations listed in the James Bay and Northern Québec Agreement (JBNQA).

1.2 Objectives of the park's creation

With this first park in a Nordic environment, the Québec government wishes above all to **protect** an exceptional geological phenomenon and a representative sample of one of Québec's largest natural regions. It also intends to **facilitate discovery** of this environment. Finally, it states its intention to **involve the Inuit** with the protection, development, and management of Nunavik's parks.

Education in the *parc national des Pingualuit* constitutes the ultimate tool to enable discovery of the territory while contributing to achievement of the objective of its protection. Educational activities encourage the understanding of landscapes, natural phenomena, and **biological diversity**, as well as history and culture of Inuit from this region of Nunavik. Thus they are bound by the mission of conservation and may not under any circumstances jeopardize the Park's natural and cultural heritage.

Recreation in a natural environment represents in the same manner as education, a way to open up to the environment. As with educational activities, the recreational activities provided for in Québec parks should, as a priority, be instrumental in achieving the mission of these territories which is to protect representative or exceptional elements of the natural heritage.

Finally, the third objective asserts a strong will of the government to involve the Québec population and, in particular, strong regional forces, with the protection, management, and development of the Park so that a natural, fertile territory be handed on to future generations. This objective found expression through the signature of an agreement on management of the *parc national des Pingualuit* with Inuit organizations.

1.3 History of the park's creation

The idea of creating a park in the region designated as the "*Cratère-du-Nouveau-Québec*" dates from the end of the 70's and was promoted by representatives of the nearest Inuit community, that of Kangiqsujuaq. Several steps have been completed since.

In 1977, Québec provided itself with framework legislation which would enable it thereafter to create parks according to criteria recognized by the World Conservation Union. From this moment on and up until the beginning of the 80's, the *ministère du Tourisme, de la Chasse et de la Pêche*³, then in charge of park matters, revised the boundaries and vocations of existing parks. It developed a policy and tools which would facilitate selection of sites to achieve its long-term objectives. It also designated among the other territories under its responsibility, those which it wished to integrate into the system of Québec parks. This planning exercise enabled the system to be established on solid foundations.

3. It is important to explain that responsibility for Québec parks was shifted to the *ministère du Loisir, de la Chasse et de la Pêche* in 1979, then to the *ministère de l'Environnement et de la Faune* in 1996, to the *Société de la faune et des parcs du Québec* in 1999, to the *ministère des Ressources naturelles, de la Faune et des Parcs* in 2004 and finally to the *ministère du Développement durable, de l'Environnement et de Parcs* in 2005.

Carte 1

Carte 1



In 1980, the territory known under the designation “Cratère-du-Nouveau-Québec”⁴ saw its park vocation set down in Schedule 6 of Complementary Agreement n°6 of the JBNQA. In this schedule, the Québec government pledged to create a park according to a determined cartographic specification.

Over the period 1980-1986, the government created 14 parks South of the 49th parallel, in the part of Québec most heavily exposed to tapping of natural resources and which undergoes the heaviest environmental pressure. Next, it declared a moratorium on new park creation in an effort to consolidate and develop established parks.

In 1989, the *ministère du Loisir, de la Chasse et de la Pêche* filed with the *Comité ministériel permanent de l'aménagement, du développement régional et de l'environnement (COMPADRE)* (permanent ministerial committee on land use, regional development, and environment) a memorandum dealing with sites of interest on Québec territory situated North of the 49th parallel, in order that the *ministère de l'Énergie et des Ressources* list them as park projects in the public land use plan then being prepared. The goal was to protect lands representative of natural regions or offering particular attractions, from the tapping of forestry, mining, and energy resources pending the moment that the Québec government be ready to allocate legal park status to such lands.

In 1990, subsequent to an inter-ministerial consultation, the *COMPADRE* endorsed the 18 projects submitted. As for the Pingualuit Crater, a new boundary was selected. Although it differed from the boundary proposed in the JBNQA, it nevertheless respected entirely the original intentions for it completely encompassed the proposed territory. The *COMPADRE* then requested that the *ministère de l'Énergie et des Ressources* list this site in the public land use plan.

In 1991, spaces allocated by the Park project aimed at protecting the Pingualuit Crater belonged to an initial group of territories North of the 49th parallel which were set aside for

park creation and thus were withdrawn from eligibility for mine staking, cartographic representation, mining research, and mining exploration by a ministerial decree issued by the *ministère de l'Énergie et des Ressources* (M.D. 91-192 (July 11, 1991), 1991 O.G.2., 4573, eff. 08/07/1991).

In 1992, the *ministère du Loisir, de la Chasse et de la Pêche* unveiled its plan of action for parks entitled “*La nature en héritage*”. An important step in recent Québec park history, this plan provided for a marked increase of areas of land protected by park status. The plan's contents bore out the Ministry's intention to create the *parc national des Pingualuit* amongst others in Nunavik, as well as its wish to interlink the regional milieu more intimately with the Park's creation and management. The Ministry underlined its intention to consult the affected communities first and to make sure of the concordance of its projects with the JBNQA.

The action plan also heralded the setting up of a mechanism for co-ordination whereby the various parties involved could discuss prospects for development of these parks. In addition it enabled a follow-up on the setting up of parks and co-ordination of their development with proposed compatible projects in the periphery.

Throughout that year steps were taken to approach the various committees arising out of the JBNQA.

In 1994, the Joint Hunting, Fishing, and Trapping Committee adopted a resolution favouring the park projects in a Nordic environment, including the *parc des Pingualuit* project, insofar as harvesting rights of the *beneficiaries* were to be respected, as provided for in chapter 24 of the JBNQA and the *Act respecting hunting and fishing rights in the James Bay and New Québec territories* (R.S.Q., c. D-13.1).

In 1995 as well, talks took place with the Kativik Environmental Advisory Committee and the Kativik Environmental Quality Commission (KEQC). It should be pointed out here that park projects to be undertaken on JBNQA territories are submitted to an environmental and social evaluation procedure.

4. So as to lighten the text, the Inuit place name “Pingualuit”, made official by the *Commission de toponymie du Québec* in 2001, will be used to designate the “Cratère-du-Nouveau-Québec”.

In 1996, the KRG, mandated with the development of Nunavik territory, issued the *Master Plan for land use in the Kativik region* in which all park projects in this part of Québec, including the *parc des Pingualuit* project, were identified. This plan received the approval of the Inuit communities in 1998.

Through the course of the same year the Inuit milieu participated intimately in the preparation of the first Nunavik park project. With a view to formalizing these discussions, the Pingualuit Working Group was set up. It was comprised of representatives of various interested associations such as the Makivik Corporation, the KRG, the Corporation of Northern Village of Kangiqsujuaq, the village's Landholding Corporation, the Nunavik Tourism Association, and the *ministère de l'Environnement et de la Faune*.

One of the first acts of the working group was to arrange recognition of the geographic name in Inuktitut of the principal constituents of the project. Thus, in the Autumn of 1998, the *Commission de toponymie du Québec* approved this request to change the name of “*lac du Cratère*” to “*Lake Pingualuk*” and the project was designated by the name “*parc des Pingualuit*”.

Throughout the Park's creation process, the regional organizations were regularly informed on the project's progress through members of the Pingualuit Working Group who met many times and through periodic meetings with Québec government representatives.

In 1998, in co-operation with the community, the *ministère de l'Environnement et de la Faune* proceeded to take an inventory of resources. In the course of the following years, it put out a Status Report on the environment and a Provisional Master Plan which explained the Park project. In parallel, it proceeded with an environmental and social impact study in compliance with the directive received from his environmental assessment department.

On November 16, 2000, in compliance with the *Parks Act* (R.S.Q., c. P-9), the Park project was submitted for public consultation in the Northern village of Kangiqsujuaq in presence of the minister responsible of Québec parks and wildlife. Throughout these hearings, a variety of groups, organizations, and individuals spoke out on the project. In 2001, an analysis of the comments put forth during the

public hearings paved the way for improvements to the initial proposition and completion of the environmental and social impact study transmitted to the *ministère de l'Environnement* on May 29. The KEQC proceeded to hold its own public hearing on November 21 of the same year in Kangiqsujuaq.

On April 22, 2002, the KEQC communicated its decision to authorize the project to the *ministère de l'Environnement*. In June, the latter forwarded to the *Société de la faune et des parcs du Québec* an authorization certificate (# 3215-18-02) issued under the authority of the *Environmental Quality Act* (R.S.Q., c. Q-2), thus enabling progression of the process leading to the Park's creation.

On January 1, 2004, the *parc national des Pingualuit* was created under the authority of governmental decree n° 1322-2003. An uncommon occurrence, creation of this Park was coupled with signature of Complementary Agreement n°17 of the JBNQA, on August 29, 2003 in order to update the geographic indication appearing in Schedule n°6 of Complementary Agreement n°6 of the JBNQA.

On March 23 of this same year, the KRG signed an agreement concerning the *parc des Pingualuit* with the *Société de la faune et des parcs du Québec*. Through this agreement, the *Société* conferred on the KRG to oversee the management services relating to the operations, activities and services of *parc national des Pingualuit*, as well as the organization of the park's services and activities, the upkeep of the park and work involving development, construction and major maintenance of the park. The *Société de la faune et des parcs du Québec* also contracted to provide the KRG with the Park Master Plan to orientate its actions. This current document constitutes Schedule 4 of this agreement and constitutes an integral part thereof.

1.4

Outcome of the public hearings

The holding of public hearings under the *Parks Act* (R.S.Q., c. P-9) attracted more than 200 persons and elicited presentation of 42 verbal or written presentations, 33 of which were made by Nunavik residents or organizations. The principal themes addressed concerned Park creation, its boundaries,



the zoning plan, the development concept, Park management, and consultation.

1.4.1 CREATION OF THE PARK

The great majority of participants (91%) proved to be in favour of creating the *parc national des Pingualuit*, in the near-est possible future, thus enabling the Québec government to follow through comfortably on its project.

1.4.2 BOUNDARY

The project's boundary gave rise to comment and proposals both in favour of expansion (23%) and scaling down (7%) of Park territory, above all concerning the Northern boundary. It should be pointed out that the Makivik Corporation and the KRG both formally supported the position that the Park not be limited to the boundary described in the JBNQA.

The position of the *Société de la faune et des parcs du Québec* with respect to requests to modify the Park boundary has been as follows :

- ❖ Conserve all the Park area proposed in public hearings;
- ❖ Extend the boundary to the North of the Puvirnituq River so as to leave the river a uniform 1 km band of protection for the entire stretch between Lake Lamarche outlet and that of Lake Saint-Germain;
- ❖ Not bring in Qajartalik Island because it remains for now under jurisdiction of Nunavut. A re-evaluation may be undertaken at an opportune moment.

1.4.3 ZONING

The *Société de la faune et des parcs du Québec* is maintaining the proposed **zoning** plan in spite of suggested corrections. In fact, application of a more restrictive **zoning** would have the consequence of preventing access to the crater, the Park's most prized area.

1.4.4 DEVELOPMENT CONCEPT

The development concept gave rise to many comments with a view to supporting and improving the proposal. In general, Park access and lodging were the most debated subjects.

The position of the *Société de la faune et des parcs du Québec* confirms the village of Kangiqsujuaq as being the only means of entry to the Park, from which an access to the crater will be established. Land access with the help of vehicles enabling transportation of small groups of visitors will be favoured to

the extent that this option proves possible without major influence on the environment and at an acceptable cost. In the event that such conditions cannot be fulfilled, other possibilities will be studied, such as air access.

As for requests to increase the number of huts and camping areas, the *ministère du Développement durable, de l'Environnement et des Parcs* will evaluate the needs of Park clientele in the perspective of increased patronage before proceeding further.

1.4.5 PARK MANAGEMENT

Many participants made comments or proposals relating to Park management. The subjects most frequently reported in this matter dealt with respect towards Inuit culture, protection of Park resources, employment, and training.

The position of the *Société de la faune et des parcs du Québec* on these subjects is the following:

- ❖ The terms of the JBNQA will be respected;
- ❖ The Inuit will be responsible for managing activities and services in the Park. It falls to the Park manager to regulate employees' work conditions. Nevertheless, the positions to be held by employees who will be in contact with visitors must be allocated to multilingual personnel;
- ❖ The agreement concerning the *parc national des Pingualuit* spells out that a Training Plan and a natural, cultural, burial, and archaeological Sites Management Plan must be carried out following Park creation.

1.4.6 CONSULTATION

The desire for consultation was expressed by several participants. Thus some of them indicated that participation of the Inuit and organizations of Nunavik in the project's establishment is the key to success and they wish to be associated with it.

A formula equivalent to **harmonization tables** developed by the Southern Québec parks is organized for the Northern parks. Thus a harmonization committee has been created under Section 9 of the Agreement concerning *parc national des Pingualuit*. Its mandate deals with Park development. This committee is comprised of representatives of the Corporation of Northern Village of Kangiqsujuaq, the village's landholding Corporation, the KRG, the Makivik Corporation, and the *ministère du Développement durable, de l'Environnement et des Parcs*.

1.5

Harvesting rights granted to James bay and Northern Québec agreement beneficiaries

18

The *parc national des Pingualuit* being the first park created on the territory covered by the Agreement, the *ministère du Développement durable, de l'Environnement et des Parcs* must clarify its position on the exercise of harvesting rights. In fact, the *Parks Act* (R.S.Q., c. P-9) indicates in Section 7 a) that *notwithstanding any provision of law, hunting or trapping of every kind is prohibited in a park*. All parks in the system implanted in Southern Québec comply with this legal provision. *Parc national des Pingualuit* visitors, non beneficiaries of the Northern agreements, are subject to the same rules. However, so that the terms of Chapter 24 of the JBNQA and the *Act respecting hunting and fishing rights in the James Bay and New Québec territories* (R.S.Q., c. D-13.1), be respected, the **beneficiaries** can exercise the harvesting right within the Park boundary.

As for the cohabitation between the activity of observing nature and that of exercising harvesting rights, the harmonization committee will attend to the conciliation of the diversified forms of the site's use.



2 Location of the park

The *parc national des Pingualuit* is located North-East of the Ungava Plateau natural region (see map 1). Enclosed between 61° 06' and 61° 28' latitude North, and 73° 13' and 74° 18' longitude West, it covers an area of 1,133.9 km². Naturally, it encompasses the exceptional attraction brought by the Pingualuit crater, as well as most of the elements that characterize the entire natural region.

The Pingualuit crater, at the Park's core, is found in a straight line 100 km West of Kangiqsujuaq, the nearest village. The latter, for its part, is situated 430 km North-West of Kuujuaq, some 1,800 km North-East of Montreal, and is only accessible by plane and boat. Boats are only used for the transport of goods.

The Park perimeter (see map 2) is essentially based on the concept of protecting the headwaters of *drainage basins*. Nevertheless, on the East and North, the perimeter departs from this condition. Thus, on the East, it backs against the boundary of Category II lands of the village of Kangiqsujuaq. Coinciding with the East bank of the Vachon River, it constitutes an easy natural landmark to identify.

On the North, the situation is more complex. The outcome of public hearings held in November 2000, demonstrated the popular desire to extend the perimeter already withdrawn from eligibility for exploration and mining exploitation. The *Société de la Faune et des Parcs* believed that the Park must afford a minimal protection to the Puvirnituk River, thus establishing a boundary allowing a uniform 1 km width of land North of the river. The *ministère des Ressources naturelles* decree dated March 24, 2003 (M.D. 2003-011 (March 24, 2003), 2003 O.G. 2., 2079, eff. 03/09/2003) confirms this governmental position. Nevertheless, presence of active mining titles in proximity of the river hinders immediate integral enforcement of the proposal. The Park boundary thus reflects this reality, being disposed in mining benches North of the river. When possible, the segments are situated 1 km North of the riverbank, while for the rest, they are backed against previously allocated titles. The latter will be gradually withdrawn from eligibility for mining activities upon their expiration and non-renewal, abandonment, or revocation, and then integrated with the Park. In the end, the Park's surface area will reach 1,148.7 km². Map 3 illustrates this situation in detail.



Carte 2

Carte 2

Carte 3



3 Status review

This chapter resumes the *Status Report* published in 2000 in which one may find more detailed information on biophysical, social, and cultural resources of the Park and its surroundings.

3.1 Climate

The climate of the Pingualuit crater region is polar tundra. Here are found the harshest conditions in Québec. Average annual temperatures run around -10°C , although mean monthly averages of the coldest months, January and February, vary around -28°C . Inversely, the monthly mean of July, the warmest month, reaches 5.6°C . The *frost-free season* is short and variable, but it averages 20 days. Total average precipitations are low, ranging from 300 mm to 400 mm annually. Although the snow component accounts for 50% of annual precipitation, ground accumulation never exceeds 1 m. Finally, only the months of July and August are virtually snowfall free.

Prevailing high force winds blow from the West and South-West, the annual mean reaching 20 km/h. As for day length, it is extremely variable. It ranges between 20 hours at Summer solstice and slightly over 5 hours at Winter solstice. Frequency of overcast and fog is 60% in the Summer period, which leaves this region one of the least sunny in Québec. Finally, lake freeze-over takes place towards the beginning of November, while the river freezing period is a few weeks later. Rivers break free at the end of June whereas lakes melt at the start of July.

3.2 Physical resources

3.2.1 TOPOGRAPHY

The Park's relief is not particularly pronounced, average altitude ranging between 450 m and 550 m. This classes it amongst the most elevated lands of Ungava. The rocky ring which forms the crater stands out from the surrounding environment with a mean rise of a hundred odd metres. At its highest point it towers at 657 m.

In contrast, the Puvirnituq River valley is delineated by a hundred metre embankment formed of sheer walls. Here is a magnificent canyon punctuated by a double 90° elbow, where raging waters surge. It channels into a U-shaped *glaciated valley* and gradually loses force downstream. In addition, a secondary canyon has been formed over a 3.5 km stretch at the Lake Lamarche outlet.

As for slopes, they are only remarkable upon contact with the crater and the canyons. They make access difficult both to Lake Pingualuk and to the rivers that snake along valley floors.



3.2.2 GEOLOGY

The majority of Park territory belongs to the Superior tectonic province formed of considerably eroded rocks more than 2 billion years old (*archean*). Acid in nature, most are comprised of *granodiorites*. To the North, in proximity of the Puvirnituk River, there is a geological contact with the **Cape Smith Belt** which crosses Ungava from East to West. This formation dating from the *proterozoic* era is more recent (500 million to 250 million years ago) and marked with a series of *folds* oriented parallel to the river. It is made up primarily of metasedimentary rocks of basic nature. The *gabbro* sill, more resistant to *erosion*, is particularly evident along the edge of the river where it forms pronounced *talus*. An *overlap fault* situated South of the Puvirnituk River indicates contact between the **Cape Smith Belt** and the Superior province. The **Cape Smith Belt** is a zone of economic interest for the region because of its high number of mineral occurrences.

The meteorite that collided with the Earth more than 1.4 million years ago provoked an explosion that modified the structure of certain rocks (*impactites*) and gave the Pingualuit Crater its circular form. It is one of the youngest and best conserved craters in the world. The *impactites* are scattered around the crater, but a higher proportion of them can be found in the “*impactite channel*” Northwest of the crater.

3.2.3 GEOMORPHOLOGY AND SURFACE DEPOSITS

As with the Ungava Plateau, the Park's bedrock was fashioned by the passage of glaciers and by frost action, an ongoing phenomenon in our times.

Thus, the last glaciation has left several traces in the Park. A deposit of *till* almost completely covers it and exceeds 1 metre in thickness over nearly half of its surface. This *till*, frequently in combination with boulders and large stones, is marked here and there with landforms linked with *glaciolacustrine* or *fluvioglacial* phases. Researchers believe however, that the crater floor was likely spared the erosive effect of the ice, thus allowing integral preservation of a considerable sediment layer which may constitute an important testimony of events preceding the last glaciation.

At the moment of deglaciation from 8,000 to 7,000 years ago, an immense lake covered almost 80% of the Park area. The former shorelines now perched, speak eloquently of this

episode, leaving an idea about the dynamics of the banks and of the ephemeral lake. Former shorelines situated within the crater interior tend to demonstrate that the depth of Lake Pingualuk also fluctuated during this era.

These days, land forms are above all linked with frost action: *frost wedging*, *ostioles*, *polygons*, *solifluction lobes*, and *ice wedges* are very widespread. Finally, the continuous *permafrost* should not be left unmentioned. It likely reaches a depth of 500 m in the region. Its existence conditions the drainage that is limited to a thin surface layer that thaws over a little more than a metre in depth each year and is known as the active layer.

3.2.4 HYDROGRAPHY

The *parc national des Pingualuit* is located at the catchment divide of waters draining either into Hudson Bay or Ungava Bay. Its Northern portion is part of the Puvirnituk River *drainage basin* whose waters flow into Hudson Bay at the completion of a 257 km Westerly course. Its central and Southern part is drained Eastward over a similar distance by the Vachon River, a sub-bassin of the Arnaud River which empties into Ungava Bay.

Extending over an area of 29 km², Lake Rouxel is the territory's largest. But there are still seven other lakes that surpass 2 km², including Lake Pingualuk which covers 6,4 km²⁵. Generally the lakes are not deep with the exception of that which fills the crater to a maximum depth of 267 m. The latter is also characterized by an isolated *drainage basin*, supplied solely by precipitation and without any apparent *outlet*

Northern Québec is renowned for the quality of its waterways. In this respect, the properties of Lake Pingualuk water are without equal in Québec. Its purity and transparency are exceptional attributes which rank it amongst the best in the world in this respect.

5. Surface Area measured from 1:50,000 sheets from the Department of Energy, Mines, and Resources Canada, using Micro-Station software.



3.3

Biological resources

3.3.1 VEGETATION

The *parc national des Pingualuit* is located beyond the tree-line, in the tundra zone. The vegetation in such environments is often underestimated. In spite of appearances, it is ubiquitous, for the great majority of it is composed of *lichens* which form a thin stratum covering the entire rocky substratum. However, moss and herbaceous plant communities can be found in humid environments. Ligneous plants are limited to a few shrub species which grow prostrate along the ground, sheltered by rock. No tree, not even stunted, grows here.

This territory's vegetation is testimony to an evident Arctic descent. It comprises 129 *vascular* plant species, 171 *lichen* species, 147 moss and sphagnum species, and 60 *hepatica* species. Despite a lack of diversity in comparison to more Southerly regions, it nevertheless comprises some remarkable elements such as four new *vascular* plant species and some twenty *nonvasculars* (*lichens*, mosses, and *hepatica*) for the Québec-Labrador peninsula. The floristic interest is particularly associated with the Puvirnituq River corridor, closely linked with the basic nature of the rocky substratum. In fact, one finds here a diversity of more outstanding plants than on the plateau, including several rare species.

3.3.2 WILDLIFE

The Park's wildlife is little known, the site's remoteness not having facilitated inventories. General knowledge about the Ungava Peninsula leads us to believe that, as with vegetation, wildlife is characterized by its great simplicity, a phenomenon accentuated by its remoteness from a marine environment, which diminishes the variety of habitats. Some 25 species of birds and around ten species of mammals live in this Northern part of the tundra and are likely to be found within the Park. Arctic charr and lake trout are the Park's most common fish species. The presence of a population of Arctic charr confined to Lake Pingualuk apparently since the deglaciation of the territory 7,000 years ago, for its part arouses undeniable interest.

In a Northern environment, low diversity is often compensated by abundance. In this connection, the presence of caribou in this place is an eloquent example as well as an unexcelled

attraction. Since 1993, the Aux Feuilles River herd's calving area occupies the Northern extremity of the Ungava, thus covering the Park entirely. Calving season extends from the end of April to the beginning of July. This herd, totalling an estimated 628,000 heads (Couturier *et al*, 2004), is thought to be increasing. It is now the most sizeable in Québec.

3.4

Archaeological and historical resources

Even though very much localized, and neither offering the richness nor the diversity of the coastal sites, the vestiges of human presence, discovered to this day within the Park nevertheless present a certain interest, for they make it possible to draw attention to the close ties that unite the Inuit with nature. These ties are still quite authentic and there is scarcely an equivalent in Western societies. The primary cluster of ancient sites was found East of the crater. These are disseminated on the summit of a long *esker* and are composed of stones placed in a circle which once circumscribed tent sites.

3.5

Present land use

At the point of Park creation, the installations only consisted of two Inuit camps, one situated West of Lake Saint-Germain, the other at the outlet of Lake Vergons. Nevertheless, several zones of the Park are frequented by Inuit who engage in their activities however, without the necessity of setting up a permanent infrastructure.



4 Landscape units, potential, and constraints

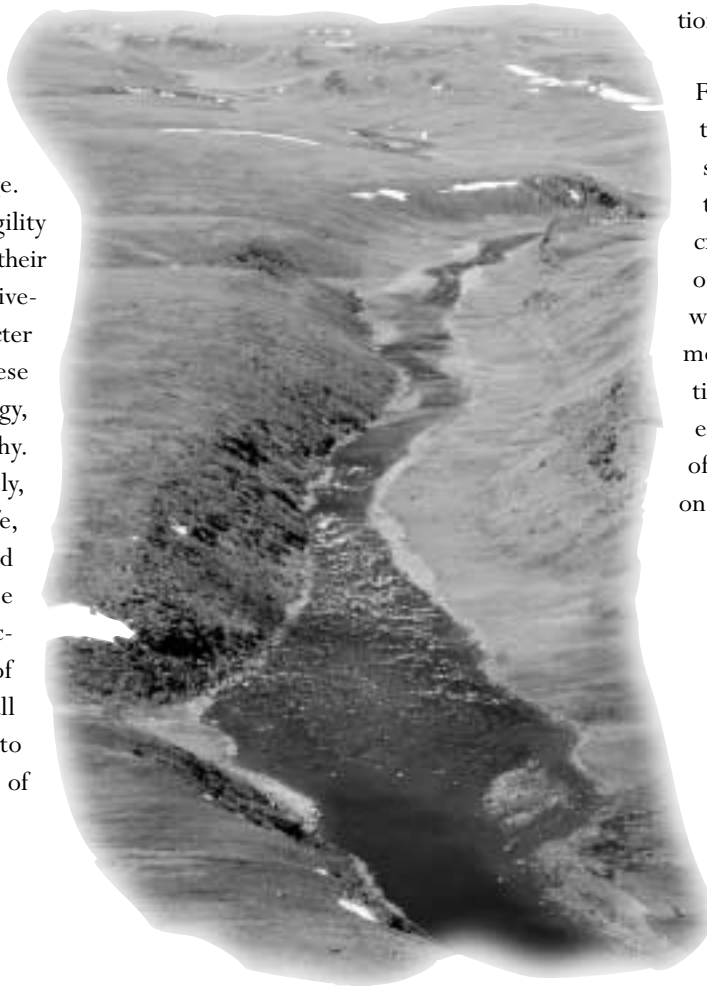
The study of biophysical parameters enabled division of the *parc national des Pingualuit* into three distinct landscape units (see map 4). Thus, while the “Plateau” unit is typical of the Ungava Plateau natural region, those of the “Pingualuit Crater” and the “Puvirnituq River Corridor” exhibit combinations of mutually exclusive features, standing out clearly from the vast whole.

The “Plateau”, in spite of the great homogeneity of its major components, nevertheless makes it possible to isolate two sub-units whose distinctness relies primarily on visual perception. These two sub-units were designated “*The Great lakes necklace*” and “*Hills of the Eastern fringe*”.

These units harbour many examples of wilderness beauty offering a potential for conservation and development of the natural heritage. They are outstanding in their fragility or their rareness, their magnitude, their quality, their degree of representativeness or in their exceptional character within the natural region. These advantages primarily involve geology, geomorphology, and hydrography. For certain units, or alternatively, in a sporadic manner, plant, wildlife, archaeological, aesthetic, and panoramic characteristics may be added as complementary attractions. Wildlife habitats offer one of the Park’s key dimensions and call for an approach that takes into consideration the individual cycles of each species.

The Park is far from being free of constraints to development. Those on the technical level, that might be described as general, characterize the entire territory. The *permafrost*, which typifies the tundra, requires adapted construction procedures so as to avoid surface thawing which could locally create irreversible ground movements. At the moment of thawing, the *permafrost* also causes surface drainage which transforms the tundra into an immense humid environment, which consequently becomes sensitive to mechanical alterations and repeated trampling. Early on in July, the surface dries and recovers greater resilience. This particularity determines the choice of infrastructure elements, their siting, and their period of implementation.

Finally, we should mention here the extremely severe climatic conditions which prevail in the crater’s surroundings and on the plateau. Cold, wind, and fog are commonplace, without mentioning that conditions are extremely capricious and often different from those on the coast.



4.1

“Pingualuit Crater” unit

The “*Pingualuit Crater*” unit occupies the central position in the Park. It combines all the elements that afford the Park its exceptional character and is at the very origin of the Park’s creation. The crater’s zone of influence is not limited to the phenomenon itself. It includes within its periphery a series of attractions of geological, geomorphologic, floristic, and archaeological nature that enrich it, but whose properties are independent of the astronomic phenomenon proper.

4.1.1 POTENTIAL FOR CONSERVATION

The waterways of the *parc national des Pingualuit* are all crystal clear and this quality must remain unaltered. However, Lake Pingualuk waters require very special attention. In fact, the long period of water renewal, evaluated at 330 years, is an eloquent indicator of the difficulty that such an environment would have in recovering after a contamination event. Measures will have to be taken in order to avoid that sediment or any pollutant emission as a by-product of human activity alter this isolated *drainage basin*.

The *impactites* disseminated in this area are not more fragile than other rocks but they are infrequent and make up the primary material on which scientific research is based. Being so small, they can only be spotted by experienced persons or in an accidental fashion

This landscape unit comprises a part of which was defined as being “*badlands*” by Michel A. Bouchard ⁶ (personal communication). It is a region composed of boulders where the terrain defies travel but presents a strong potential for scientific research. It extends Northeast from the crater to the Vachon River. The boulders and stones found in the “*badlands*” are made up in part, of a field of glacial boulders and ejecta residue produced by the meteor’s impact. The fine sediments which are found on the terrain underlying rock and boulder-laden fields contain an abundance of pollen grains originating most probably from the pre-glacial or interglacial era.

6. Michel A. Bouchard is a professor in the department of geology at the University of Montréal. In particular, he led an expedition to the Pingualuit crater in 1988.

Finally, the “*Pingualuit Crater*” unit harbours the majority of the Park’s archaeological sites, one series of which is situated at the summit of an *esker* East of the crater. These are emotion laden sites whose influence on a visitor is spell binding. They represent a tangible line of descent which leads one’s thoughts through a voyage in time and captures the essence of a nomadic life style. Wandering and overturning rocks can destroy precious clues for archaeologists and consequently such activity must be avoided.

4.1.2 POTENTIAL FOR DEVELOPMENT

The crater’s crest, towering a hundred metres above the surrounding plateau, is the Park’s most elevated sector. Jutting its silhouette up through the horizon, it stands out as an incomparable landmark. From the summit one discovers a unique panorama opening out onto a perfectly circular waterway, surrounded by sheer walls forming a true rock sanctuary. Depending on lighting variations, the waters take on a range of hues reflecting both their transparency and their depth. The ridge also facilitates discovery of the immenseness of the surrounding rocky plateau, while offering an eyeful over a singularly wide horizon silhouetting lakes and far-off hills.

From within the crater, impressions are poles apart. The Lake takes on an undreamt-of dimension. Routine winds can whip up rather large waves which break thunderously against boulder covered shores. The crater jealously protects this unique lake by restricting the key to its access to a solitary breach where the slope eases. For man, the crater has always been an important landmark as attested by ancient tales (*Ministère des Affaires culturelles*, 1980) and by the vestiges of human occupancy discovered at its feet.

Doubtlessly, the “*Pingualuit Crater*” unit landscape is the Park’s richest and it will serve as a point of attraction to visitors.

4.1.3 CONSTRAINTS ON DEVELOPMENT

The principal constraint linked with development in this unit is the presence of plunging slopes which form the crater sanctuary. The steeply sloped walls are covered with unstable boulders which could cause severe wounds to the more adventurous, both within and outside the crater. Besides, problems of *erosion* on steep slopes may be connected with the repeated passing of hikers.

Carte 4

Carte 4



Outside of the crater, the “*badlands*” is a true boulder field which makes travel quite difficult, even on foot.

4.2 “Puvirnituk River Corridor” unit

The “*Puvirnituk River Corridor*” unit is located at the very North of the Park. It consists of a 2.5 km ribbon spanning both sides of the Puvirnituk River extending almost 40 km. It incorporates the spectacular Puvirnituk River Canyon and that of Lake Lamarche.

4.2.1 POTENTIAL FOR CONSERVATION

This landscape unit is associated with geological formation of the **Cape Smith Belt**. The basic nature of the rocky foundation makes the richness of the **vascular** vegetation stand out distinctly from that of the “*Plateau*”. The flats which follow the river are green, an unusual occurrence at this latitude and in an arid environment, while the scree slopes shelter, in their crevices or on their overhangs many rare and invaluable plants. These escarpments also offer a potential Falconidae nesting habitat, compounded with a very real rare plant presence.

4.2.2 POTENTIAL FOR DEVELOPMENT

Foldings, overlap faults, parallel alignment of rocky crests, *differential erosion, trellis drainage pattern*, existence of canyons, presence of a more abundant vegetation, and potential nesting habitat for the falconidae are so many elements that distinguish the “*Puvirnituk River Corridor*” from the surrounding plateau.

We wish to point out in addition, the vigour of the river itself which dynamizes the zone and whose activity contrasts with the languid waters of other portions of the Park. The Puvirnituk River becomes, along with the crater, an important visual landmark in this homogeneous tundra universe. The downstream portion of the river, with its canyon, must be observed at a distance from the edge of the domineering plateau that thrusts a hundred perpendicular metres above. For wildlife as well, the river seems to point the way. Caribou trails are plentiful both on the slopes and at the base of the **glacial valley** and it is not rare to spot at one of the elbow detours, a group of Canada geese which when disturbed, flies off awkwardly carrying on its journey.

The “*Puvirnituk River Corridor*” displays such a diversity of attractions that it comes an easy second among the Park’s centres of interest.

4.2.3 CONSTRAINTS ON DEVELOPMENT

Like the preceding unit, the “*Puvirnituk River Corridor*” manifests sheer slopes throughout the canyon’s some 40 km course. Reaching the base of the valley is thus only possible via a few breaches carved by slow moving watercourses.

4.3 “Plateau” unit

The “*Plateau*” coincides with the major part of the Park. The “*Plateau*” subdivision arises, from the line-up of the territory’s great lakes which, arranged in a U around the crater, form a necklace, as it were, skirting it from West to East and also, of a series of small rolling hills at the Eastern edge of the Park taking form, and extending Eastward.

The “*Plateau’s*” major traits are of geomorphologic and hydrologic description. A vast plain of **till**, **hummocky till**, long segments of **eskers** interlaced by abandoned stream beds, boulder fields, **drumlin** fields, **roches moutonnees**, **rocky outcrops**, **kames**, raised beaches highlighted by a series of shorelines and **deltas**, are a diversity of land forms decorating and embellishing the rock laden ground. All tell the tale of the landscape transformations throughout the course of the last millennia. **Polygons**, **solifluction lobes**, **ostioles** are other contemporary phenomena linked with the cold, a fundamental characteristic of this environment.

The plant covering is ever present, though unapparent for it is largely made up of **lichens** which grow on rock without need of soil. However, more humid spots sporadically harbour the odd moss or tiny herb.

As for wildlife, let us add that caribou are omnipresent in this zone and that almost all typical tundra bird species should be found here, such as the snowy owl, snow bunting, and the rock ptarmigan. Traditional knowledge collected from village elders highlight the productivity of purportedly fish rich waterways and the abundance of arctic fox.

4.3.1 POTENTIAL FOR CONSERVATION

The “*Plateau*” boasts all the distinctive characteristics of the natural region that enable the *parc national des Pingualuit* to

adequately fill its roll of representativeness. This unit is vast and manifests a relatively uniform altitude to which it owes its name. Moreover, there are innumerable lakes. Large or small, most are characterized by their shallow depth and rocky shores, whose irregular landforms fit the description of a bedrock fracture system. They are clearly predominant in the “*Great lakes necklace*” sub-unit and their waters are extremely pure.

The “*Hills of the Eastern fringe*” sub-unit is characterized by presence of a double **overlap fault** which encircles a ferruginous hill at the summit of which a station of rare plants has been spotted. The high floristic potential extends over the entire contact zone. Furthermore, in very close proximity to the ferruginous hill there still subsist vestiges of a former camp site composed of a few circles of rock circumscribing the tents and campfires.

4.3.2 POTENTIAL FOR DEVELOPMENT

Geomorphologic, hydric, vegetal, and wildlife characteristics of the “*Plateau*” offer visitors the chance to discover a location representative of the natural region.

The “*Great lakes necklace*” sub-unit waterways are impressive in size and pour from one to the next through a succession of small rocky outlets. Lake Saint-Germain is included in this chain of “*pearls of water*” even if it belongs to the Puvirnituq River **drainage basin**. The catchment divide, absolutely unapparent here, blends in visually with the total picture. Some particularities of geological, archaeological, and vegetative nature notably in the vicinity of Lake Vergons and Lake Saint-Germain, locally embellish this sub-unit.

The elevation of the “*Hills of the Eastern fringe*” sub-unit barely exceeds 560 m; the summits rise some 50 m above the plateau. These hills do not have the slightest resemblance to the long hills which line the Puvirnituq River. This is rather a transition zone at the contact between rocks from the **archean** and **proterozoic** ages. Once again we find the geomorphologic forms previously listed for the “*Plateau*”. This sub-unit draws attention to a few ingredients, as an area with a concentration of **sheltered moraine trails** and **drumlins**.

4.3.3 CONSTRAINTS ON DEVELOPMENT

The primary constraints on development in the “*Plateau*” landscape unit are consequences of the substratum and hydrography. It is a very rocky sector, and in several areas are found boulder fields which prevent motor vehicle travel and make even hiking difficult. In addition, the multitude of lakes and waterways, permanent or temporary, limits the development of an infrastructure.

4.4

Judicious choices to be made

As can be easily deduced from the above, the primary elements to protect in the *parc national des Pingualuit* also constitute points of attraction for visitors. Thus, major orientations, the **zoning** plan and the development concept must be set out to preserve the Park’s **ecological integrity**.



5 A national park

The steps taken during the seventies by the Inuit of Nunavik to protect the Pingualuit crater have paid off. A national park henceforth protects this exceptional phenomenon in Québec. Such status provides for conservation of this unique element of our natural heritage while making it accessible.

Comments received at the November 2000 public hearings contributed to improvement of the initial position, particularly with respect to the boundary and development concept. Moreover, management orientations and the **zoning** plan are tools that make it possible to carefully set out long-term actions to attain a harmonious result without harming the *parc national des Pingualuit*'s precious attributes.

5.1 Issues

Protection of the *ecological* and cultural *integrity* of a territory as well as the quality of its landscapes, while still making it accessible to visitors, presents a considerable challenge. In the same perspective, control of pressures originating from outside the Park is also an element to contend with.

The primary issues involving management of the *parc national des Pingualuit* are the following:

- ❖ Protect the Park's *ecological integrity*, cultural resources and landscapes;
- ❖ Prone a framework of integrated environmental management on a regional level;
- ❖ Promote community commitment to protecting the Park's ecosystems, ecological processes, and cultural resources;
- ❖ Offer a high quality ecotouristic product.

5.2

Orientations

The orientations that the *ministère du Développement durable, de l'Environnement et des Parcs* intends to pursue are based on the following observations:

- ❖ The Park stands out from the other parks in the system by its virgin nature;
- ❖ The Park is far from communities and difficult to reach;
- ❖ The Park is endowed with exceptional internationally recognized characteristics which offer an important feature of attraction but require a high degree of protection, particularly for Lake Pingualuk;
- ❖ The man-nature-culture links constitute an important dimension of the reality of this territory and of the region;
- ❖ Park development must respect the intentions of the Inuit nation which requested that the Park's vocation be set down in the JBNQA;
- ❖ The JBNQA provides for the exercise of harvesting rights by its *beneficiaries*, a factor that distinguishes this territory from that of other Québec system parks where harvesting of wildlife is absolutely forbidden, with the exception of fishing which is controlled;
- ❖ This Park also caters to eco-tourist clientele in search of adventure and a radical change in scenery;
- ❖ The Park becomes an integral part of a local ethno-tourist context which offers abundant possibilities for development.

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5.2.1 ORIENTATIONS ON PROTECTION OF THE NATURAL AND CULTURAL HERITAGE

In spite of the territory's remoteness, previous studies have enabled acquisition of a certain knowledge of the Park's natural and cultural resources. Thus, using the precautionary principle it is possible to achieve efficient management of the territory, even if current management tools have to be adapted to pertain to a Northern environment. In this respect, it should be stressed that it will be essential to pursue the research. Thus we will be better equipped to maintain the territory's innate characteristics. The natural, cultural, burial, and archaeological Sites Management Plan sets forth positive measures toward this end. A periodic update will be necessary to provide particularly for increased Park patronage and advancement of knowledge. This plan appears in Section 5 of the agreement concerning the *parc national des Pingualuit*.

The following general orientations have been adopted to protect the natural and cultural environment:

- ❖ Develop a deeper understanding of the ecosystems and phenomena that give the Park its exceptional character, representative of the natural region, specifically by supporting research in this field;
- ❖ Using the precautionary principle in all Park development efforts while respecting the natural environment's carrying capacity;
- ❖ Take into consideration the impacts of Park use and those from outside the Park which threaten or are likely to threaten its ecosystems and cultural resources;
- ❖ Valorize regional reality in research efforts as well as in those with a view to Park conservation, in particular during execution of the natural, cultural, burial, and archaeological Sites Management Plan;
- ❖ Integrate the community of Kangiqsujuaq's traditional knowledge into the actions that will be taken involving resource conservation as well as into management of activities and services.
- ❖ Extend priority to research supported by the communities and further the integration of traditional knowledge therein;
- ❖ Co-operate in regional activities seeing to preparation for environmental emergencies;
- ❖ Foster cultural exchange between visitors and members of the community.

5.2.2 ORIENTATIONS ON THE OFFER OF ACTIVITIES AND SERVICES

Within the framework of the revision of the Parks policy, the *Société de la faune et des parcs du Québec*, in 2002, issued a framework document spelling out policy involving selection, establishment and management of services and activities (educational, recreational) in Québec parks. The activities and services provided in the national parks must first and foremost be instrumental in achieving the objectives inherent in the mission of these territories. The latter are both tools for protection of representative or exceptional elements of the natural heritage and ideal spaces for engaging in outdoor activities. Thus provision of activities and services is based upon the following three principles:

- ❖ Activities and services must exert a minimum acceptable impact on the heritage;
- ❖ Activities and services must foster discovery of the heritage;
- ❖ Activities and services must facilitate accessibility.

These three principles must not be considered in isolation from one another. In fact, priority has been given to the first principle, which signifies that conservation takes priority over usage. Thus an activity or service that would not satisfy the first principle is not compatible with the Québec parks system offer and is generally forbidden, even if the second and third principles have been respected.

Furthermore, the *ministère du Développement durable, de l'Environnement et des Parcs* has relied on the following orientations in drawing up its programme of recreational and educational activities in the *parc national des Pingualuit*:

- ❖ The educational activities provided must further the popularity of the mission and the main natural characteristics of the Park as well as the surrounding cultural milieu;
- ❖ The educational activities provided must adopt the recreational-educational approach as well as the environmental education approach;
- ❖ Educational activities foster the respect of regulations in effect in the Park;
- ❖ The offer of activities is to be adapted to vulnerability of the natural environment, the large distances to cover and difficulty of travel, the paucity of visitors, and their individual needs;



- ❖ Recreational activities and services offered are to be geared primarily to visitors having little or no life experience in a Northern environment and whose technical skill is sometimes limited;
- ❖ For reasons of safety, available activities call for visitor supervision by a guide. However, a self-reliant visit may be considered under certain conditions. Visitors wishing to undertake such an expedition must demonstrate that they are well prepared for such an experience and that they are able to ensure their own survival in Northern conditions;
- ❖ The activities must highlight Inuit culture.

5.3 Zoning

Park **zoning** is a legal tool which sets orientations as to the degree of protection and development foreseen for each of the units that make up the Park. It is important to point out in this respect that the orders and regulations associated with the **zoning** plan not hinder the exercise of harvesting rights granted to Inuit **beneficiaries** of the JBNQA. Nevertheless, in the course of discussions within the *Pingualuit Working Group*, Inuit representatives showed considerable sensitivity and responsiveness in recognition of conservation principles focused on by the Park.

The *parc national des Pingualuit* **zoning** plan (see map 5) takes into account as much as possible, descriptions of use of the territory by people from the community, of its relative inaccessibility, and its anticipated low patronage.

Thus it was deemed necessary to categorize maximum preservation, preservation, and ambiance zones. A small services zone was nevertheless designated with the primary purpose of satisfying long-term Park management needs should its patronage exceed forecasts.

5.3.1 MAXIMUM PRESERVATION ZONE

A surface area of 6.4 km² (0.6 % of the Park area), which corresponds to the surface filled by Lake Pingualuk, being allocated as a zone for maximum preservation, will make it possible to ensure the integrity and exceptional purity of its waters. Thus, no activity or harvesting will be permitted

beneath or at the lake's surface. Scientific research may be authorized under certain conditions and upon presentation of a complete description of the project demonstrating that the techniques used will be in harmony with the Park's conservation objectives.

5.3.2 PRESERVATION ZONES

There are four preservation zones that make up a considerable proportion of the Park area, totalling 472.4 km² (41.6 %). They protect a representative sampling of all the Park landscape units and include sectors that manifest a certain vulnerability. Here visitors are directed to act in a way that they will not interfere with the most vulnerable elements and no motorized travel is permitted. Rustic camping is allowed along the long backpacking trek for this practice satisfies the environmental ethics code defined in the natural, cultural, burial, and archaeological sites Management Plan.

A first preservation zone circumscribes Lake Pingualuk thus encompassing the Pingualuit crater. Its area is 18.3 km². Irregular in form, the exterior boundary of this crown is largely determined by a criterion of 550 m elevation, except for the North where a slight protuberance enables inclusion of the **impactites** channel, a part of the "*badlands*," as well as a habitat for rare plants. Another protuberance to the East, this one larger, incorporates into the preservation zone a chain of archaeological sites established at the summit of a long **esker**. Another occurrence of rare plants has been observed here. That is to say then that the effect of this preservation zone is to prohibit access to the crater lake by any motorized means, thus ruling out contamination of the **drainage basin** by escape of petroleum products or other contaminants. This also avoids the washing away by rain water of sediment generated by destabilization of **talus** from repeated trampling. This zone's boundary line nevertheless provides for the possibility of approaching by snowmobile, the corridor which accesses the lake, without penetrating to the crater interior. This measure is being taken for safety reasons, in order that visitors may see the crater during the Winter period without having to stray too far from their vehicles.

A second zone, this one more imposing, involves protection of representative and exceptional elements of the territory, simultaneously affecting the "*Plateau*", the "*Great lakes necklace*" and the "*Puvirnituq River Corridor*". It is established at the South

of Lake Vergons so as to include two vulnerable sites, one of archaeological interest, the other of floristic nature. It continues Northward thus protecting all of the Lake Rouxel *drainage basin*, the Park's largest, and that of Lakes Perron and Lamarche. At the North of Lake Lamarche, the boundary of this preservation zone blends with the Southern bank of Puvirnituk River and indents Eastward, terminating a little less than 5 km from the river's double elbow. Because of its dimensions, it is estimated that the zone comprises a complete sampling of the Park's major components, be they associated with the "Plateau" or with the "Puvirnituk River Corridor".

A third preservation zone covers the territory found between the Northern bank of the Puvirnituk River and the Park boundary. It is a continuous zone extending from the Lamarche River outlet and approaching the Lake Ours Blanc outlet. From this point, the Park boundary segments the river according to its meanderings until the Lake Saint-Germain outlet. All these portions of the Park territory North of the river are zoned "preservation". This preservation zone comprises some vulnerable, rare, or spectacular elements particularly associated with the walls of the Puvirnituk River canyon. Over time, once the foreseen expansion has been completed, ongoing preservation zone status will be established North of the river. Here again, visitors are invited to travel on foot.

A final preservation zone is formed on the "Hills of the Eastern Fringe" of the Park from the South-East bank of the Lake Saint-Germain. Its purpose is to protect a habitat for rare plant that have been found there, as well as a portion of territory with high floristic potential, a site of geological, cultural, and archaeological interest, as well as a host of small unusual geomorphologic forms. This 18.6 km² zone has been restricted in size so as not to encroach on the surroundings of Lake Saint-Germain that are frequented by Kangiqsujuaq residents in all seasons.

5.3.3 AMBIANCE ZONE

The ambiance zone takes up almost all the remaining space totalling 654.3 km², representing 57.7% of the Park's overall surface area. In contrast with the preservation zones, it enables motorized vehicle travel and establishment of infrastructures such as huts. Although the zone is vast, motorized travel and visitor stay-overs are concentrated at well delineated sites. Fishing is authorized in waterways included in the

ambiance zone and this is partly what led to identification of a slender branch in the North of the Park corresponding with the base of the Puvirnituk River Valley. The restriction to catching fish solely for immediate consumption seems essential for safety reasons, for this zone will be frequented by *backpacking* enthusiasts. In fact, the pursuit of this activity always has its risks which may extend the length of one's stay-over thus entailing food shortage. Incidentally, it is well known that occasionally Inuit take this route on snowmobile to reach the village of Puvirnituk.

5.3.4 SERVICE ZONE

A small service zone South of Lake Laflamme covers almost 0.8 km² or 0.1% of the total area. It encompasses a proglacial *delta* that has already been used a few times for establishment of camps for researchers and prospectors. Attribution of this zone category primarily signifies its greater carrying capacity. The designation of such a zone will enable satisfaction of eventual Park management needs that may arise in the long-term, particularly involving user safety as well as upkeep and surveillance of the territory. This zone would be ideal should it prove necessary to construct additional installations for lodging visitors or Park wardens, storage of material, or then again, establishment of a weather station.

5.4

Development concept

The *parc national des Pingualuit* is characterized by a high quality environment, virtually undisturbed. It seems fitting that its development respect this intrinsic richness, hard to come by in the modern world, and put it to good use. This leads to focusing the Park's development on the concept of an original eco-tourist product, based on conservation of this exceptional environment and discovery of the Pingualuit Crater, but where visitors are invited to appreciate a still untouched Northern environment in a more all-encompassing manner. This experience will be brought about by provision of activities and services, including an educational programme whose objective is that a visitor

- ❖ become imbued by the aspects of space, isolation, climatic particularities, etc. that tundra has to offer;
- ❖ discover the natural and cultural potential that characterize the region;

Carte 5

Carte 5



- ❖ understand the close links that meld the Inuit with their environment and become aware of their culture.

Such an objective presupposes that the Park visit extend over a period of a few days. A visitor must also have the possibility of mingling with Inuit and interacting with them. Finally, to ensure visitor well-being and receptiveness, a minimum of facilities should provide for his safety and comfort. In this vein, the concept depends on the presence of rustic equipment which blends with a natural environment, encourages its discovery, and respects local traditions. It is important to point out here that a Park visit is enriched by all experience acquired outside its boundary. In this spirit we emphasize that Kangiqsujuaq's surroundings are endowed with remarkable natural and cultural attractions. Furthermore, Schedule 3 of the agreement concerning *parc national des Pingualuit* provides that a part of the Park's **business plan** must extend beyond the Park to incorporate its surrounding areas and that a **communication plan** designed specifically for Kangiqsujuaq residents must be prepared so that they may take advantage of possibilities generated by the Park.

As for the Park specifically, visits will be possible during two seasons, whose length will be limited by climatic conditions, the period of **permafrost** surface thawing, and caribou vulnerability while calving. There are two outstanding poles of interest. These are the Pingualuit Crater at the very heart of the Park, and Puvirnituq River Canyon, to the North-West. In both cases, given the vulnerability of certain of their resources, no motorized access is permitted and only light equipment is available there.

A large section of the Ungava Plateau intervenes between these two entities twenty kilometres or so apart. That is to say that in an imaginary quadrant delineated by the North-West and East axes, and centred by the crater, a visitor may have contact with all of the Park's remarkable and representative elements. This reality implies the positioning of internal travel arteries, the course of which is determined by the technical properties of the soil and the location of waterways. Other isolated areas may nevertheless be visited by water. These, however, will not require particular preparation.

The major elements of the Park's development concept appear on map 6, while a description of the equipment by category follows below.

5.4.1 ADMINISTRATIVE SERVICES

The Park's administrative services are established in Kangiqsujuaq, at the visitor centre. A warehouse, also in Kangiqsujuaq, will make it possible to accomplish the storage and upkeep tasks essential to the Park.

5.4.2 VISITORS RECEPTION

Given the Park's remoteness, welcoming of visitors takes place at the village of Kangiqsujuaq, which serves as the Park's outpost. Upon arrival, travellers at the visitor centre receive detailed information necessary for their stay in the Park. They will be provided with all the appropriate instructions upon registration. To keep good control of activities and for safety reasons, such registration is obligatory upon arrival and departure, whether the visitor be accompanied by a guide or not. Travellers may also rent specialized materials. As needs arise, they are referred to local organizations and enterprises operating in the domain of offer of services.

5.4.3 ACCESS TO PARK

At the point of Park creation, the only frequently used means of reaching the Park was by snowmobile. Exceptionally, some gained access by air, and rare persons from the community ventured there by ATV in Summer; the exercise is very demanding. Discussions within the *Pingualuit Working Group* and presentations at the public hearings made it clear that the people of Kangiqsujuaq ardently desired that a land link be developed.

In light of the Park's isolation, access, internal travel arteries, and means of transport constitute the back-bone of the entire development concept. Choices have to be made carefully for they have a considerable influence on preservation of the environment and the richness of visitors' experiences.

Winter access

Snowmobile has been selected as a means for Winter access to the Park. Optimal visiting conditions are confined within the March to June interval, for the first months of Winter are very harsh and days are cut extremely short.

Created by the local population, a system of snowmobile trails radiate from the village of Kangiqsujuaq. One of these trails heads towards Lake Itirviluarjuk situated half-way between the village and the crater (see map 7). Extension of this marked trail to Lake Cournoyer, then to the crater and Puvirnituq River, will be completed. All visitor travel in the

Park is channelled along this sole trail in order to avoid a dispersion that would mushroom impacts on the natural environment.

Summer access

Preparation of a Summer land-link with the Park called for an in depth analysis, for it is technically difficult to achieve because of the presence of *permafrost*, waterways to be crossed, unavoidable boulder fields, and scarceness of unconsolidated deposits that might otherwise serve as borrow pits.

A preliminary analysis led to identification of the optimal siting of a corridor for construction of an access route. Extending 118 km, the route would link Kangiqsujuaq to Lake Laflamme while passing in the vicinity of Lakes Qulusuttalik, Itirviluarjuq, and Cournoyer. The equipment initially proposed consisted of a narrow trail freed of its major obstacles, and intended for vehicles carrying small groups. However, in the light of more in-depth studies, the project has become more extensive because of requirements inherent in construction techniques with the result that it would be more akin to a conventional route. This modification had a major effect on the environment and construction costs, which leads us to opt in preference of an air access.

Two separate types of aircraft are being considered to transport passengers and to satisfy Park operational needs. Firstly, the choice of a Twin Otter type plane to transport small groups of visitors with all their equipment has been arrived at. It is a versatile aircraft frequently used in Nunavik and which can land in complete safety on a rudimentary 300 m airstrip. An overflight of the territory with an Air Inuit Company pilot made it possible to determine an adequate site near Lake Laflamme (see map 6).

On the other hand, helicopter use is contemplated but only for Park needs. High charter costs and the cramped space offered by this craft make it less appropriate for the transportation of passengers and their baggage.

However, the choice of an overland access with the Park remains open. Indeed, the extent of mining activity in vicinity of the Park and village is likely to lead to preparation of routes from which links may be established to reach the Park. This option will be re-evaluated should this eventuality materialize.

5.4.4 ACTIVITIES

As for the Québec parks system, discovery and appreciation of the *parc national des Pingualuit* heritage can only be achieved through recreation and education. It is true that Park clientele happen to be on vacation and, in this context, they wish to partake in outdoor activities that solicit a certain physical exertion. In addition, education constitutes a method of choice to facilitate and enrich discovery, by pointing out to visitors the significance of observed phenomena or landscapes.

Education

Education about natural environment constitutes a preferred means of achieving the purpose of Park conservation. The *parc national des Pingualuit* harbours entirely original attractions coupled with a great aesthetic character. In addition, this first park created in Nunavik offers an occasion to come into contact with Inuit culture, which imparts an absolutely unique charm.

The *parc national des Pingualuit* education plan identifies and describes the educational potential of a natural, cultural, and sensory nature most likely to be developed on Park territory and in the Kangiqsujuaq region. Also presented within are the clientele and the objectives targeted by proposed education; on this score, it is important to point out that this proposition is not only intended for eco-tourists patronizing the Park, but it is also designed for Kangiqsujuaq residents, particularly young Inuit who frequent the academic milieu.

The education plan also describes several educational means adapted to the context of promotion of the Park and its surrounding region. The first scheme consists of an exhibit established at the visitor centre featuring local natural and cultural attractions.

Other schemes are proposed by the educational plan: demonstrations of traditional know-how by members of the Kangiqsujuaq community, discussions, guided hikes requiring Inuit knowledge, etc. An adequate programme adapted for Inuit expected to act as guides will, as the situation requires, see to perfecting their education in communication and in more technical fields.

Carte 6

Carte 6

Carte 7

Carte 7



Day hiking

Hiking is the Park's most popular activity though no trail has been prepared for this purpose. Low projected Park patronage does not weigh in favour of such an infrastructure since the effects on the natural environment will be negligible (*Société de la faune et des parcs du Québec*, 2001). However, map representation of places which stay clear of vulnerable areas (archaeological, rare plant sites) and where walking is easier, is being attended to. In spite of advantageous relief, travel on foot remains difficult given the omnipresence of endless boulder fields. Because of their instability and slippery surfaces in humid weather, they slow headway and necessitate good equipment. For the majority of visitors, hiking will be concentrated around the crater and in the Puvirnituk River valley.

Turning to the crater, a fifteen kilometre hike can easily be achieved on the ridge by following trails carved by repeated passing of caribou. Signs indicate to visitors the direction to take to avoid the most problematic sectors and to follow safe courses. Some corridors are periodically cleared of unstable rocks in order to facilitate travel. On site identification of the trail acceding to the only existing safe pass that reaches Lake Pingualuk, is also assured. The other paths are dangerous because of the steep slopes of the crater interior covered with unstable boulders.

In the Puvirnituk River canyon, hiking is easier. Recommended courses stay away from the most vulnerable areas, which are for that matter almost inaccessible. As it may be risky for hikers to descend to the base of the Puvirnituk River valley, safe courses are marked. Hiking at the base of the valley however, requires fording which is only possible in low water periods at precise points. The latter are marked on site.

Finally, it must be emphasized that in the absence of marked relief and well defined trails, hikers should be forewarned against travel when it is foggy for risk of getting lost.

Day cross country skiing

Day cross-country skiing is similar to *day hiking* in that no trail has been prepared for the purpose. Nevertheless, the presence of a snow covering facilitates travel in that it covers natural obstacles. However, cross country skiers must be well informed of the dangers of Winter excursions, above all when

the wind whips up; visibility then becomes limited, and risks of frostbite and hypothermia can not be counted out.

Backpacking

One may engage in *backpacking* within the Park, along the Puvirnituk River in particular. Such excursions are reserved for experienced persons and call for excellent planning.

Establishment of a transportation service providing the return of visitors or supplying them to strategic points may be contemplated. Such service would make the activity more accessible and would provide a certain control over user safety. Nonetheless, visitors wishing to partake in *backpacking* in Summer or in Winter, must be able to demonstrate to Park authorities that they have the supplies and physical capacity to do so. For evident safety considerations, they must also be made aware of the importance of respecting the instructions with which they are provided.

Dog-sledding

It is possible that in the middle term, the people of Kangiqsujuaq rediscover this once honoured Arctic means of transport: dogs harnessed to a *qamutiik*. This activity would fit in well with the unrivaled experience available in the Park and would surely be more than popular with visitors. If this project materializes, trail courses will then be subject to a specific analysis.

Canoeing-kayaking

Following a water route including the Vachon River and Lake Nallusarqituq makes it possible to reach some Park zones that are otherwise almost inaccessible. The journey encounters neither rapids nor white water; the interest of such an adventure stems from the endurance it solicits and the isolation it offers. At the limit, Lakes Vergons and Rouxel along this course may also be touted, but they call for long portages over rock strewn surfaces.

To reach the hut located near the canyon, there exists another potential trajectory passing through Lake Saint-Germain and the Puvirnituk River. More tumultuous, the river is navigable only in high water periods. At low water, the level often becomes insufficient to float a small craft and rocky banks make manoeuvrings arduous.

In any event, we believe that the number of enthusiasts for these water activities will be low; their pursuit will therefore not require specific facilities. Canoe-kayakers must set up their camps in compliance with the general principles involving accommodation which are made available at the Park visitor centre.

In addition, as the Park is situated at the headwaters of Puvirnituq and Arnaud River *drainage basins*, it is possible that it will serve as departure point for two long canoe-kayak expeditions that will enable to reach Hudson Bay on one side near the village of Puvirnituq, and on the other side Ungava Bay, near Kangirsuk. Those engaged in such trips must be totally self-reliant. Just as other visitors, they are obliged to comply with the Park code of ethics and safety rules.

Wildlife harvesting

Fishing may be associated with various other Park recreational activities on designated waterways, insofar as catches are consumed on site. Such a measure makes it possible to avoid overuse to the detriment of the community whose food supply derives partially from the same resource. The natural, cultural, burial, and archaeological sites Management Plan sets the harvesting conditions in consultation with community officials.

Other activities

Requests for activities other than those previously mentioned will be examined on a case by case basis. Nevertheless, should the activities involve so-called “*extreme*” practices, they will be considered according to the framework conditions defined by the Québec parks system in its ensemble.

5.4.5 ACCOMMODATION

Accommodation in the *parc national des Pingualuit* is adapted to distances, operating seasons, climatic conditions, means of transport, activities pursued, and user safety. All forms of accommodation are rustic. Strict rules of conduct are set out in the natural, cultural, burial, and archaeological sites Management Plan for use of drinking water, and management of domestic waste, wastewater, body hygiene, etc., to make sure the sites remain in good state. Information communicated to visitors also induces them to adopt behaviour that will avoid attracting predators.

The community of Kangiqsujuaq has expressed its intention of providing, as part of the guide service package, the possibility

of constructing igloos during Winter excursions. Visitors that wish to may pass the night within, which would contribute a poignant element to their Nordic experience.

Huts

A community shelter formula has been selected to serve Park clientele. Above all it is conceived for Winter customers, but it is also appreciated in Summer when weather conditions deteriorate. Five huts, spaced about thirty kilometres apart from one another, are planned along the snowmobile route (see map 7). Three of them, outside the Park, are located near Lakes Qulusuttalik, Itirviluarjuk, and Cournoyer. Those within the Park are located at the South-East extremity of Lake Laflamme, at about 3 km from the crater, and near the double elbow of the Puvirnituq River canyon. The huts comprise basic installations to provide a minimum of visitor comfort: heating, table, beds, and space for meal preparation. Water supply can be attained from nearby waterways. Hut occupancy must be booked in advance, but huts are also a gathering point in case of emergency. Food reserves and a first aid kit among other things can be found there.

At Lake Laflamme the situation is unique. In addition to providing the same commodities as the other huts, the space allocated to community services is increased. Given that it is the Park’s dynamic centre, visitors will stay there longer and patronage is likely to increase with time. Availability of accommodation may be adapted to this reality all the while maintaining the objective of providing a rustic product. Thus, accommodation capacity may be increased but preferably be divided into independent units.

Camping

Rustic camping is the favoured manner of accommodation during the Summer period and all Park users are invited to provide themselves with the necessary materials. They may thus explore a more vast territory and enjoy a unique experience. The primary destination being the crater, a designated camping area is located about 1 kilometre from the Lake Pingualuk access corridor and another near Lake Laflamme. Platforms have been constructed so as to reduce the impact that scattering of visitors over the natural environment might cause, as well as to see to their comfort.

Signs indicate to hikers walking on the crater ridge, the passes and sites amenable to setting up camp. It is strictly



forbidden to camp within the crater and on its ridge, so as to preserve the Lake's integrity and for safety considerations. In point of fact, gale-force winds can arise and easily destroy a camp. It is more advantageous to camp outside of the crater, where accelerating effect on the wind, provoked by the crater walls and the altitude, is less marked and where it is possible to build a low protective wall with stones.

In the Puvirnituq River canyon area, a few camping platforms have been installed near the hut. As in the case of the crater, signing indicates places where it is possible to set up a camp in the river valley, protected against scree, and out of the way of rare plant habitats.



6 Conclusion

It is with pride that the Québec government has proceeded with creation of *parc national des Pingualuit*, Nunavik's first. This interactive work with the Inuit has paved the way to fruition of an intention written in the JBNQA and to increase of the initial agreed upon surface area by 393 km².

The current status report demonstrates that with its 1,133.9 km² area, the *parc national des Pingualuit* adequately represents the Ungava Plateau natural region in addition to protecting exceptional elements. The foreseen expansion on the North bank of Puvirnituk River will ensure a better protection of the headwater of the river.

In brief, creation of the *parc national des Pingualuit* fosters significant enrichment of the Québec national parks system both by virtue of its surface area and its distinctiveness.

The ultimate goal of the current master plan is to assure conservation of this territory for future generations, all the while extending its use to visitors. With this aim in view, the Park's educational programme is seeing to attracting public attention to the territory's intrinsic characteristics and to integrating traits of the Inuit culture within. Recreational activities of an extensive character will provide intimate contact with this remarkable environment thus fostering resourcing and discovery of pure nature while avoiding damage to the most vulnerable elements. Visitors will live a unique experience here while discovering the Pingualuit crater, observing Québec's largest caribou herd, contemplating exceptional landscape, and experiencing a way of life that is unfamiliar to them.

Let us add finally, that creation of the *parc national des Pingualuit* is among the first achievements of the Partnership Agreement on Economic and Community Development in Nunavik signed April 9, 2002. This is the first link in a series of national parks that are expected to be established in Nunavik thanks to co-operation among the *ministère du Développement durable, de l'Environnement et des Parcs*, the Kativik Regional Government, and the communities involved. An achievement such as this will contribute to stimulation of tourist and economic activity in Nunavik, thus benefiting the entire population.





7 Glossary

Sources :	<i>a</i>	Parent, 1990.
	<i>b</i>	Genest, 2000.
	<i>c</i>	Ministère de l'Environnement et de la Faune, 1997.
	<i>d</i>	Landry and Mercier, 1992.
	<i>e</i>	United Nations Conference on Environment and Development (http://www.un.org/geninfo/bp/enviro.html)
	<i>f</i>	Ayotte, 1994.
	<i>g</i>	Parks Canada Agency, 2000.
	<i>h</i>	Société de la Faune et des Parcs du Québec, 2002.

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Arcadian: Most ancient period in geological times, anterior to 2.6 billion years.^a

Backpacking: Expedition including at least one sleepover in hut or camping. It may be a hiking or cross country skiing experience.^h

Beneficiary: Beneficiary of the JBNQA as defined in chapter 3 of that agreement.

Biological diversity: Diversity of living organisms of all origins including among others, land, marine, and other aquatic ecosystems and the complex ecosystems that they are part of; this includes within and among species diversity as well as that of ecosystems.^h

Bryophyte: Photosynthetic, terrestrial, aquatic, or epiphytic plant without xylem nor phloem.^f

Business plan: The business plan is to cover at least a three-year period. It will comprise:

- **A Tourist development plan,** whose goal is development of natural and cultural sites while maximizing potential economic benefits for the region.
- **A marketing and communication plan for the Park and its zone of influence,** spelling out generally what will be done to attract visitors into the Park and the adjacent village, as well as which media to call on. It will indicate also, the means set up to describe the Park, the manner in which visitors should prepare their trip, and the dangers that they may confront.
- **A tourist guidebook of the Park,** enabling visitors to identify Park boundaries, including activity and accommodation areas. This guide should also explain the potential, activities, and services provided by the host village and its surrounding areas.

Cape Smith Belt: Band exceeding 50 km, oriented East-West, crossing the Northern Nunavik. It is a zone of *folds* and *overlap faults* produced during Ungava's orogenesis.^c

Communication plan: This document will be designed for residents of the village involved. It will help the latter and those of Nunavik to develop and reap benefits from tourism and other economic possibilities derived from the Park.

Day hiking: From a walk covering a short distance to an excursion taking up a complete day.^b

Delta: Geographic and geomorphologic entity resulting from accumulation of marine or lacustrine sediment built up by the waterways at their mouths.^a

Differential erosion: Unequal land erosion because diverse types of rocky matter have varying resistance.^a

Drainage basin: Natural geographic region drained by one or several waterways and their tributaries.^a

Drumlin: Hill comprised of moraine material in elliptical form, of convex sloped sides, and a longitudinal profile. Frequent in glacier-covered regions, drumlins are oriented in the direction of glacial flow.^a

Ecological integrity: The state of an ecosystem judged characteristic of the natural region of which it is a part, more precisely by the composition and abundance of indigenous species and biological communities as well as through the rhythm of changes and the maintenance of the ecosystem's ecological processes. The ecosystems are said to be integral when their indigenous components, plants, animals, and other organisms as well as their processes such as growth and reproduction are intact.^g

Erosion: Ensemble of ablation and accumulation phenomena that contribute to modify land topography. Two prevalent types of erosion are found: chemical erosion and mechanical (or physical) erosion.^a

Esker: Relief of alluvial origin, narrow, with steep, sinuous, and very elongated slopes, oriented in the direction of a continental glacier.^a

Fault: Fracture surface with relative displacement of rock walls in occurrence and sometimes present in sediments that have been frozen, as a result of stress or compression. The part displaced over the fault plane is the hanging wall and the part underneath constitutes the footwall.^b

Fluvioglacial: Said of continental sediments and topographical landforms resulting from the action of glacier meltwaters.^a

Folding: Tectonic phase culminating in formation of folds.^a

Frost-free season: Period of the year characterized by absence of frost.^a

Frost wedging: Phenomenon of fragmentation of coherent rocks through frost action.^a

Gabbro: Magmatic plutonic, granular, rock primarily comprised of plagioclase and pyroxene.^a

Glacial valley: Wide flat-bottomed valley which grows broader with erosion under the steep resistant rock edges with U-shaped profile.^b

Glaciolacustrine: Said of landforms and sediment characteristic of lakes at glacial ice margins.^a

Granodiorite: Plutonic rock more than 20% comprised of quartz, plagioclase, and alkaline feldspar.^a

Harmonization table: Committee established following creation of a park and gathering local and regional interested parties so as to co-ordinate their actions and activities in the park periphery. They also counsel the Park administration on its development and management.



Hepatica: Class of *Bryophyte* grouping among the most simple of terrestrial plants.^f

Hummocky till: Group of small flared mounds sometimes presenting a central depression. It is thought that this hummocky till results from stagnation and melting of an ice mass.^c

Ice wedge: Generally vertical crack which in places penetrates several metres into the ground in Northern regions. It is composed of ice which deforms adjacent layers. While thawing, it is filled with unconsolidated material derived from superficial layers.^a

Impactite: Rock having conserved traces of meteor impact. It is comprised of minerals transformed or molten (molten glass) under the shock of impact.^c

Kame: Hill or mound comprised of diverse material (gravel, loess, etc) deposited by meltwater or winds at the edges of a glacier tongue.^a

Lichen: Extremely resistant vegetal organism living along the ground surface, formed from symbiosis of a filamentous fungus and a microscopic algae.^a

Nonvascular plant: Plant with no *vascular* system; plant belonging to the Thallophyta or *Bryophytes*.^f

Ostiole: Metric periglacial relief, discharge of muddy liquid made up of fine, slimy, sandy material and shock-sensitive. This model takes the form of a nonsorted circle.^b

Outlet: Waterway evacuating the waters of a lake, pond, grotto, reservoir, etc.^a

Overlap fault: Slightly inclined *fault* between two rocky fault walls, the hanging wall is mounted on the footwall. An overlap fault is associated with horizontal compression, often the case of thrust sheets.^b

Permafrost: Layer of permanently frozen soil or rock found between the active layer and the profundal zone whose temperature is always below 0° C.^a

Polygone: Periglacial form frequently found in tundra environments and whose dimensions vary considerably: from a few metres to several tens of metres.^a

Proterozoic: Second eon of the Precambrian. The proterozoic spanned from 2,500 Ma to 590 Ma ago.^b

Roche moutonnee: Said of a convex, polished, and glacial action striated rock.^a

Rocky outcrop: Appearance of bedrock at the surface of the ground.^a

Sheltered moraine trail: Streak of *till* on the downstream side of a resistant rocky knoll modified by the glacier's action.^a

Solifluction lobe: The thawing and slow descent of the layer of water saturated *till* along the side slopes.^c

Talus: Chaotic accumulation of scree at the foot of a of a hillside or cliff.^a

Till: Heterogeneous unconsolidated glacial deposit. It comprises in varying proportions clay, loess, sand, gravel, and stone.^a

Trellis drainage: Type of drainage that is formed in regions where rock structure determines water flow. It may be folded or inclined rock with parallel *faults*.^d

Vascular plant: Refers to a vegetative tissue or a region consisting of a conductive tissue, the xylem, or the phloem, or generating such tissue.^f

56 Zoning: Within parks, zoning divides the territory into portions having distinctive regulations concerning vulnerability and the carrying capacity of the resources.



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