Hydro-Québec presents

GREAT NORTH

Teacher’s Guide
Preface

Watching the giant-screen film Great North is an adventure all on its own. The film plunges you into a magnificent environment, sparsely populated by little-understood aboriginal peoples — the Inuit of northern Canada and the Saami of Scandinavia. It’s guaranteed culture shock for anyone living below the Arctic Circle!

In order to help you get the most out of the film, we’ve created this Teacher’s Guide. Aimed primarily at 11-to-16-year-olds, the guide is also appropriate for both younger and older students — either in or out of a school setting.

The guide is a perfect complement to the Great North experience. You can use it to prepare for a screening of the film, or to gain a deeper understanding of the North afterwards. The content of each chapter is based on elements in the film, and is meant to provide a more in-depth understanding and place Great North in a larger context. While it draws on the film, the guide is a stand-alone document that can be used to explore northern themes. You should find it useful even if you are unable to attend a screening of Great North. It is our hope that, by making this guide widely available, people throughout the world can gain a greater understanding of the North.

Although you can use the guide without having seen the film, we strongly encourage you to watch Great North if you have the opportunity. That way you will appreciate the magnificence of this unique environment at the top of the world — a magnificence we can only begin to capture in words.

Dress warmly, and bon voyage!

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Using this guide
Each chapter in this guide follows the same structure. Information is presented in a question-and-answer format, with sidebars offering interesting facts and statistics. A glossary defines the more unfamiliar words in each chapter (these words are marked with a number in the text).

The final section of each chapter is divided into three parts: the first is an activity reviewing the chapter’s content; the second is an invitation to further exploration; and the third provides questions linking issues in the film to personal experience.

Each chapter can be used on its own. There is no need to go through them in sequence; use them in whatever order is most convenient.

In most cases, the text is addressed to the teacher or group leader, but some sections (including diagrams and instructions for activities) that can be copied and used as handouts for students or group participants are marked with this symbol:

We have tried to keep the materials needed for the activities to a minimum. We have also tried to make each chapter as comprehensive as possible — but of course, you can always go farther! There are lots of additional resources out there that you can take advantage of, such as Web sites, atlases and other reference books. You will find a suggested list of resources at the end of each chapter.
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If you think that life in the Great North is a daily, harsh struggle for survival, well, think again! Of course, it does take special gifts to live and prosper in the world’s most inhospitable zone, but the North is also a place of poetry and magic, music and myth-making. People have been living in the far North for millennia, and they have developed fascinating and unique ways of thriving in their environment.

Their greatest ally? The caribou, in Canada, and its close cousin in Sweden, the reindeer. With an Inuit guide, Great North follows the herds of caribou through the Canadian North as they make their annual trek of more than 7 000 kilometres, which gives them the title of greatest migrating land mammal on Earth. The white deserts of the winter, the brief and colourful summer buzzing with flies – the herds face all these conditions and more, as their migration opens a window on the Northern landscape for us.

In the Arctic reaches of Sweden, the Saami people learned to tame the reindeer even before other cultures elsewhere on our planet learned to domesticate the horse. The Saami are the cowboys of the North, and we’re invited to the autumn round-up to join them as they care for their herds of reindeer.

Great North shows us unique ways of living that are perfectly adapted to extreme environments. Patience, a respect for nature’s lessons and the bonds of community are what’s needed. Inside their snow houses and tents, we watch the Inuit and Saami passing on what they know to their children, making sure that their way of life will remain eternal.
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Chapter I

The Far North and its Environment

Locating the Arctic
Understanding the northern climate
Introducing the Arctic landscape

GOALS

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GEOGRAPHY
What is the Far North?

Good question! The Far North, which is often used as a synonym for the Arctic, is difficult to define. Usually, it’s described as the portion of the Earth located north of the Arctic Circle (latitude 66° 33’ North) — but that arbitrary limit includes regions of Scandinavia where, thanks to the Gulf Stream, the climate is warm enough for cold-blooded creatures like lizards, snakes and frogs to survive. On the other hand, it excludes Canada’s James Bay, an important habitat for the polar bear. It also leaves out the Quebec-Labrador peninsula, where the tundra (a type of arctic vegetation) reaches its southernmost latitude (56° North).

A number of different boundaries have been suggested as ways of defining the North: the southern edge of permafrost (ground that stays frozen all year round); the tree line; the geographical distribution of certain animals; the isotherm1 of 10° Celsius (50° Fahrenheit) in July. The scientific community has debated them all, and all have been found lacking in some way.

With an area of more than 14 000 000 square kilometres (5,405,400 square miles), the region above the Arctic Circle is so vast that it inevitably defies definition. Instead of thinking of the North in terms of a single criterion, we should understand it as a region defined by a complex set of characteristics. However, anybody standing on an ice floe in the company of Inuit or polar bears, can reasonably claim to be in the Far North!

What are the differences between the Arctic and Antarctica?

The main difference lies in the fact that Antarctica is a continent — an imposing mass of land (and ice). The Arctic, on the other hand, consists primarily of the Arctic Ocean, throughout which lie scattered a number of relatively small land masses. All that water has a moderating effect on the climate: it heats the atmosphere, allowing for greater plant and animal diversity and for the survival of human beings. The same kind of thermal exchange would never be possible in Antarctica, where the ice can be as thick as four kilometres.
Which countries are located in the Arctic?
No country lies completely within the Arctic Circle. However, the following countries have territory within the Circle: Canada, the United States (Alaska), Russia, Finland, Sweden, Norway and Denmark (Greenland). The northern tip of Iceland also brushes the Arctic Circle. So the Arctic extends over three continents: North America, Europe and Asia.

CLIMATE
What are seasons like in the Far North?
The North sees long winters (with winter defined as the period during which the average daily temperature is below freezing). In some places, winter starts in October and ends in June. Generally, the closer you get to the North Pole, the longer the winter.

On the other hand, summer (defined as the period during which the average daily temperature is above freezing) is rather short. In some places, it lasts only two weeks!

In summer, nature goes into overdrive, with an accelerated reproductive cycle and an explosion of life across the land. That kind of frenzied growth and activity is inevitable in an environment where the number of degree days\textsuperscript{2} for plants to grow is under 300 (compared to 2,000 in Montreal, Canada).

As for spring and fall, they are little more than intermediate periods of heating up or cooling off, lasting only a few weeks. These two seasons are defined by maximum temperatures above freezing and minimum temperatures below the freezing mark.

What is the Midnight Sun?
Because of the way the Earth is inclined, sunlight is not distributed evenly between the Equator and the poles. As a result, for six months the North Pole is sunlit 24 hours a day — so the sun shines at midnight.

During those six months, the sun’s height in the sky varies every day. It gets higher until June 21 and then gets lower — but it never sets. After the six months, the sun dips below the horizon. It’s the start of the long polar night, which also lasts six months.

The farther you get from the poles, the less marked these extremes become. At a certain distance from the pole, the

Snow, According to the Inuit

In northern regions, there are many different names for snow — depending on texture, thickness and density.

Choose the wrong kind of snow when you’re building an igloo and it might collapse.

\textbf{Aniu} Snow that you melt for drinking water
\textbf{Putak} Granular snow
\textbf{Apun} Falling snow
\textbf{Patuqun} Crystalline snow
\textbf{Pukaraq} Powdery snow
\textbf{Qanik} A snowflake

Inuit words for snow seem to sound as soft as snow itself.
period of continuous light lasts only for one day (June 21, the summer solstice). And the period of continuous darkness also lasts only a day (December 21, the winter solstice). The point at which this happens is the Arctic Circle.

How low do Arctic temperatures go?
The sun’s rays shine on the Arctic obliquely, instead of directly — so they pass through a thick layer of air before reaching the Earth’s surface. As a result, there is less solar energy available to heat the ground. Add to this the fact that snow and ice reflect some of that heat straight back to the sky, and you’ve got a recipe for cold. But how cold?

The record is held by Verkhoyansk, a town in the Russian Arctic, where a temperature of -69.8° Celsius (-93.6° Fahrenheit) was once recorded. And that’s without the wind chill factor! That’s impressive, but annual average temperature is an even more significant measure of cold. In certain Arctic stations, annual average temperature is as low as -20° Celsius (-4° Fahrenheit). By comparison, Montreal, Canada, enjoys an average annual temperature of 7° Celsius (44.6° Fahrenheit). In July, the average Arctic temperature doesn’t climb above 10° Celsius (50° Fahrenheit). Daytime temperatures can climb as high as 20° Celsius (68° Fahrenheit). The Inuit find this kind of heat uncomfortable.

Are there big snowstorms?
Yes and no. It’s true that blizzards can rage for days, but the amount of snow that falls is relatively small.

The cold Arctic air is not conducive to the accumulation of humidity in the atmosphere, and that limits precipitation. In fact, in several Arctic locations, such as Alert, Canada, precipitation does not exceed 200 millimetres (7.9 inches) a year. By comparison, Moscow receives over 600 mm (23.6 inches) and Montreal gets over 1 000 mm (39.4 inches).

Most snow falls in October, after which the atmosphere becomes too cold to absorb humidity. As a result, snow storms consist mostly of fallen snow whipped up off the ground by high winds. Though not much new snow falls, the storms are still both spectacular and dangerous.

Does a climate like this lead to any unusual phenomena?
Yes, in particular mirages. Just as in the desert, there can be large variations in temperature among different air strata. For instance, the air is much colder closer to the ice on the ground and the frozen ocean than it is a few metres higher up. Sunlight hitting an object is deflected as it passes through different layers of air — so an observer sees a mirage. With warm air lying above the colder layer (as is the case in the Far North), the deflection of rays of light makes
objects appear larger, straighter and taller. Thanks to this effect, it is sometimes possible to see objects below the horizon that would normally be invisible.

Another Arctic phenomenon is fog made up of tiny ice crystals suspended in the air. The fog reduces visibility, but the Sun is usually not completely obscured. Deflected in various directions by the crystals (depending on their shape and position), sunlight comes through as luminous haloes, which may be more or less colourful depending on the degree to which light is reflected or refracted.

**What is snow blindness?**

One of the dangers humans face in the Arctic environment is snow blindness. This inability to see is caused by overexposure to the sun’s ultraviolet rays, combined with light reflecting off the snow. As all this light floods the eye, it can cause a burning of the cornea, followed by a swelling of the eyelid. The combination makes seeing through the eye impossible. The blindness is accompanied by increasingly sharp pain.

To cure snow blindness, rest the eye by keeping it in darkness for a few days. If no steps are taken to rest the eye, the condition can lead to permanent damage — and even blindness. Inhabitants of Arctic regions have learned over time to shield their eyes by making sunglasses out of a wide range of materials. These glasses are not made of protective lenses; they allow a minimal amount of light to pass through small slits.

**PHYSICAL FEATURES AND GEOLOGY**

**What does the Arctic look like?**

Arctic land- and seascapes vary greatly. The land is generally flat, but can include impressive mountains and boulders. The few trees found here are stunted and scraggy, and grow scattered here and there. Moving north, trees give way to a rockier environment, with discontinuous low plant cover. In winter, the glacial icecap, which permanently covers most of the Arctic Ocean, stretches several hundred kilometres southward. In summer, the melting of the ice opens up channels so that ships and migratory sea mammals can venture forth.

**What is the ground like in the Arctic?**

In general, there is no soil in the North. The rocks in the landscape that do not lie bare on the land are covered by morainic deposits of glacial or fluvi-glacial origin, and are concentrated in valleys and coastal areas. Rocks, gravel and sand lie scattered around.

Instead of soil, it would be more appropriate to refer to the substratum of matter affected by the action of freezing and...
thawing as cryosoil. However, in some areas, lichens can create a thin layer of soil that allows plants to take root. These roots trap the elements that can eventually lead to the creation of true soil.

One unique characteristic of Arctic ground is permafrost. Located at a depth of between 20 centimetres (7.9 inches) and 3.5 metres (11.5 feet), permafrost is a permanently frozen layer that can go as deep as 600 metres (1,969 feet). In some spots the permafrost has probably not thawed for tens of thousands of years. This is why perfectly preserved woolly mammoths have occasionally been found in these regions.

The sub-soil is often rich in minerals like nickel, copper and gold. However, these resources are only minimally exploited because they lie in such a remote and harsh environment. There is increased interest in pumping oil from the Arctic Ocean, but environmental problems remain an obstacle. Because the cold slows chemical and bacterial processes, pollutants in the North degrade much more slowly than in the South.

**How are icebergs born?**

Icebergs are majestic floating cathedrals of snow and ice — feared for the danger they present and, at the same time, admired for their stunning shapes and colours.

Where do icebergs come from? It all starts with glaciers. These mountains of snow get heavier and larger each year, as new layers of snow and ice are added to them. Slowly, over the years, they flow or slide towards the sea in a continuous process of melting and re-freezing. When they reach the water, huge chunks of ice — icebergs — break off, or calve, and drift with the ocean currents.

While icebergs may be beautiful, their danger to navigation is real (think of the Titanic, which sank after hitting one). Because of the difference between the density of water and that of ice, seven-eighths of any iceberg must lie below the surface of the ocean to let it float. It is this hidden, underwater mass that presents such a danger to sailors.

As icebergs melt, they slowly break into pieces that they leave in their wake. Before dissolving completely, an iceberg will travel thousands of kilometres (or miles). An iceberg that begins its journey at latitude 75° North near Baffin Bay could journey 4 000 km (2,486 miles) to a point 800 km (497 miles) south of St. John’s, Newfoundland, in Canada. Occasionally, icebergs are spotted as far away as Bermuda and Ireland.
Chapter I

Glossary

1. **Isotherm**: A line connecting places that have the same average temperature.

2. **Degree day**: Difference, expressed in degrees, between the average daily temperature and the temperature at a particular reference point. This reference point has been set at 5° Celsius — the temperature at which most plants can function normally. So a day with an average temperature of 12° Celsius would have seven (12 minus 5) degree days.

3. **Wind chill factor**: Factor of perceived temperature adjustment based on the loss of heat caused by the outside temperature in conjunction with wind speed.

4. **Refraction**: The change of angle when light travels from one medium (such as air) to another medium (such as ice or snow) at an oblique angle.

5. **Morainic deposit**: A deposit of rocky matter torn from the earth by the grinding action of a glacier, and then deposited elsewhere — often several kilometres (or miles) away. This kind of deposit is called glacial when it has been left by a glacier alone, and fluvio-glacial when it is swept along by water flowing from a melting glacier.

6. **Substratum**: Rocky matter in the ground mostly covered by deposits.

Activity

Finding the North

Goal:
To become familiar with the location, geography and seasons of the North

Materials:
1 globe
1 light source (light bulb or flashlight)
1 washable marker for drawing on the globe (optional)
1 map of the world or atlas (optional)

Directions:
1. On the globe, identify the rotational axis that passes through the poles. Then find the lines marking latitude and longitude. Latitude is shown by horizontal lines that divide the earth into slices and run perpendicular to the axis. Longitude is shown by lines that meet at the poles and divide the earth into pieces like the slices of an orange. For this activity, we are interested in latitude.

2. With your group, find latitude 0°, also known as the Equator. Everything above the Equator is calculated as degrees North; everything below it is calculated as degrees South. Degrees of latitude start at the Equator and the numbers get higher towards the poles. Find the lines that mark 30°, 60° and 90° North. The last one is just a point at the top of the globe. It is the North Pole.

3. Find the Arctic Circle, located at approximately 66° North. The line may not appear on your globe. If your globe does not show the Arctic Circle, use a felt pen to draw it in as a dotted line circling the globe at 66° North. The line should be parallel to the other lines of latitude and should brush the northern tip of Iceland (found between Europe and Greenland).

4. Find the following continents: North America, Europe and Asia.

5. Find the following countries, all of which include territory that lies within the Arctic Circle: Canada, the United States (Alaska), Denmark (Greenland), Iceland, Norway, Sweden, Finland and Russia.
Let's Explore Some More:

6. The Earth’s axis passes through the poles and leans at an angle of 23° relative to a vertical line. Make sure your globe has approximately the same angle.

7. Place your globe and a light source on a table or desk, so that they are in the same relation to each other as the Earth and the Sun on June 21 (see drawing at left). Turn off the lights in the room. If you are using a flashlight, point it at the globe to simulate the way the Earth is lit by the Sun.

8. Turn the globe slowly on its axis. You’ve just created day and night! Note how the light strikes one particular point on the globe (your region or country, for instance) during the course of one day.

9. It’s time to explore the seasons! Move the globe around the source of light passing, in order, through the positions of the Earth and Sun on September 21, December 21 and March 21, before returning to June 21. You have just completed one year. Note how the light strikes one particular point on the globe throughout the year.

Questions:

What are the seasons like at the North Pole, at the Arctic Circle and where you live?

On June 21 and December 21, how long is the day at the North Pole, at the Arctic Circle and where you live?

What effect does the length of the days and nights have on the lives of people who live north of the Arctic Circle?

How would you fare in the Arctic days and seasons?

Resources

BOOKS

WEB SITES
Arctic Circle: arcticcircle.uconn.edu
International Arctic Environment Data Directory: www.grida.no/add
Northern Flora and Fauna

GOALS

Learning the characteristics of northern vegetation
Understanding how plants grow in the North
Learning more about land and marine creatures that live in the North

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FLORA
How does vegetation in the Arctic differ from plants found farther south?
When thinking about the North, many people imagine a deserted, treeless expanse stretching to the horizon — thinking that vegetation couldn’t possibly grow and flourish in this environment. But the truth is very different: the North is graced with a wide variety of plants. Starting in the south and travelling northwards, we see deciduous forests giving way to more resistant evergreens. Continuing on towards the North Pole, trees become smaller and more sparse until we reach the tree line. At this point, the climate is so harsh that trees cannot survive.

Other vegetation does not disappear to the same extent. Herbaceous plants, lichens and mosses reign in this landscape. Even at these high latitudes, plants manage to grow and reproduce. There are two broad zones of vegetation in the Arctic. To the south we find a forested land called the taiga, which borders to the north on the tundra.

What is the Tundra?
The word tundra is of Saami origin (see Chapter 5). It refers to a cold plain with arid ground and bare mountains, buffeted by strong winds. In July, the maximum average temperature here is only 10° Celsius (50° Fahrenheit). So the tundra is a zone marked by groups of plants that can survive at very low temperatures — braving the tough Arctic climate year after year.

In this climate, trees grow very slowly. A 300-year-old willow might be only a few centimetres (or inches) high. The growing season is so short that it might only grow 1/4 of a centimetre taller (1/10th of an inch) each year.

Some plants may spend more than an entire year covered in snow. This forces them to adapt in order to stay alive so that they can complete their lifecycle once the snow melts.
What is the Taiga?
The word taiga is of Russian origin. It refers to a zone of vegetation circling the globe south of the tundra. Here, we find milder average temperatures. The growing season is longer — but the temperature can still plunge to -45° Celsius (-49° Fahrenheit). It is in this region that caribou spend their winters.

Plant life in the taiga varies from one region to another. In North America, it is made up primarily of conifers (especially spruce). In Europe, there is a wider variety of trees, ranging from birch to pines. Swamps, sandy plains and lakes lie scattered throughout the taiga.

How do plants manage to grow in the North?
Arctic plants do most of their growing during the very short Arctic summer, when they get an average of 18 hours of sunlight (and solar heat) a day. Depending on latitude, the growing season can last for months or only a few short weeks.

In many places, the lack of forest cover allows flowering plants, shrubs, grasses, lichens and mosses to flourish in full sun. But in order to grow, these plants have to battle extreme cold, the abrasive action of particles blown by the wind, and soil that is poor in essential nutrients.

Sprouts appear as soon as the temperature warms up enough. They huddle together to protect themselves from the cold and wind. Some even manage to raise the ambient temperature 10° to 20° Celsius (50° to 68° Fahrenheit) above air temperature. Most plants are perennials that can live from 20 to 100 years. They lie close to the ground, rarely growing taller than 15 cm (5.9 inches). Their closeness to the ground protects plants from strong winds carrying snow and bits of gravel.

Several hundred species of flowering plants grow in the harsh Arctic climate — but they make up only 3% of the world’s flowering plant species. The farther north you go, the less diversity of flowering plants you will find. The islands of the High Arctic have only about 50 species. Many northern plants are edible, and have been the staple of northern dwellers’ diets for centuries.

Lichens
Lichens are the caribou’s most important source of food. Lichens are made up of a combination of algae and fungi that are extremely resistant to arid conditions as well as cold and heat.

Lichens grow on the ground, on trees, on rocks, and throughout the tundra. They can live hundreds of years, but are very fragile and grow slowly. It can take lichens 25 to 50 years to re-cover an area after a herd of caribou has passed through. The length of time will depend on how badly the caribou have trampled the ground.

Because of the poor nutritional quality of lichens, caribou must eat 5 to 6 kilograms (11 to 13.2 pounds) of lichens every day.
Cetaceans
Large numbers of whales come to feed in the icy Arctic waters during the summer. At this time of year, the water is teeming with an abundance of food — especially small fish and plankton.

Pinnipeds
The walrus and many species of seals inhabit northern waters. They have played a very important role in the survival of northern peoples — providing food and clothing, especially to the Inuit.

Sea birds
Sea birds in the Arctic often build their nests on cliff-sides. One of the more common species is the razorbill.

Polar bears
The Inuit consider the polar bear a "marine animal" because it swims with ease and spends much of its time along the shoreline and on ice floes. Nevertheless, it is the largest land-based mammal in the North.

Fish
Fish like Arctic char, halibut and capelin are prey for many marine animals. They make up an essential part of the relatively simple food web found in these cold seas.

Note: this illustration goes with the picture on page 5 (below). Animals are not necessarily drawn to scale.
Chapter 2

Carnivores
Wolves are among the North’s largest land-based predators. To survive, wolves are opportunistic feeders. Like their cousins, the Arctic fox, they don’t pass up carrion.

Ungulates
Caribou and their cousins, reindeer, are certainly the creatures most closely associated with the Far North. But moose and muskoxen (though these number far fewer than caribou) may also be found in various regions of the Arctic. The caribou live in large herds. Muskoxen form smaller herds and moose live alone.

Birds
The North’s wide-open spaces allow birds of prey, such as the snowy owl and the golden eagle, to capture many small rodents. Birds of prey share their airspace with primarily granivorous (grain-eating) birds, such as the common redpoll and the snow bunting.

Rodents
Rodents form the basis of most northern carnivores’ diets. Lemmings, voles and beavers play an important role in the ecosystem. Cyclical fluctuations in their numbers lead to similar cycles among their predators.

Note: this illustration goes with the picture on page 4 (above). Animals are not necessarily drawn to scale.
Discovering the True Nature of the North

Goal:
Learning more about northern flora and fauna.

Materials:
Reference book on plants, dictionary or encyclopedia.

Directions:
1. On the illustration below, identify the tundra and the taiga.
2. Write the name of each plant or tree (from the list on the left) under the appropriate image.
3. Write the number of each plant in the appropriate box in the illustration below. Which plants grow in the tundra? Which grow in the taiga?

Answers on page 8

**Glossary**

1. **Abrasive action:** The action of particles of sand, gravel and snow carried by the wind as they strike, wear down and damage plants.

2. **Food web:** The complex set of relationships that exists between predators and prey in a particular area. In simple terms, who eats whom? We used to call this the food chain, but food web is a more accurate reflection of reality.

3. **Opportunistic feeder:** An animal that does not stick closely to a particular diet. Opportunistic feeders take advantage of every opportunity to eat.
Let's Explore Some More:

4. In the word box, find the words below, all of which have to do with birds and their environment.

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5. The 9 letters that remain form a mystery word that describes behaviour typical of Arctic birds.

- Air
- Beak
- Canada Goose
- Chat
- Crow
- Dive
- Duck
- Eider
- Falcon
- Feathers
- Flight
- Gull
- Hawk
- Kite
- Magpie
- Murre
- Owl
- Plover
- Ptarmigan
- Puffin
- Razorbill
- Sandpiper
- Sea
- Skua
- Snowy owl
- Thrush
- Vireo
- Wing
Chapter 2

Questions:

Each habitat has its own unique set of plants and animals. What are the differences between plant life in the taiga and the tundra? What other habitats can you name? Can you name some other plants that live in these habitats?

Edible plants play an important part in the diet of northern peoples. Which of the plants shown on page 6 are edible? In what form are they eaten? Can you name other edible plants that grow in the wild?

All of the birds in the mystery word box live in the Arctic during at least part of the year — all except two. Which are they? (Answer: Chat and Kite.) Can you name other species of birds that do not live in the Arctic? Do you know of any other birds that live in the Arctic, but whose names don’t appear in the box?

The mystery word in the box reminds us of the importance of migration to birds’ survival. What do you think pushes birds to head off on their migratory journey? Are there birds that stay in your area year-round? Can you name some of them? Can you name some migratory birds that live in your area?

SOLUTIONS: 1. The ecosystem on the left is the taiga, the one on the right is the tundra.


3. Plants 1,3,5 and 8 are found in the taiga. The others are found in the tundra.

5. HIDDEN WORD: MIGRATION

Resources

BOOKS

WEB SITES
Arctic Wildlife: www.mnh.si.edu/arctic/html/wildlife.html
Flora of Iceland: www1.bos.nl/~dvuijk/plants/index.html
Land and Wildlife of the Nunavut: www.arctic-travel.com/chapters/florapage.html
Caribou and Reindeer

GOALS

Reviewing the life cycle of the caribou
Understanding the relationship between some of the caribou’s physical characteristics and the environment
Exploring caribou migration

IN GENERAL  2
PHYSICAL CHARACTERISTICS  3
LIFE CYCLE  3
GLOSSARY  6
ACTIVITY: CARIBOU TRAVELS  6
RESOURCES  8
IN GENERAL
What exactly are caribou (besides a symbol of the North)?
In the popular imagination, the North is closely linked with the image of the caribou. They may symbolize the Arctic landscape, but under their coats, caribou hide many fascinating characteristics essential to their survival.

Caribou are land-based mammals belonging to the cervidae family. Their distribution is circumpolar, throughout the world’s northern (both Arctic and boreal) regions. All caribou are migratory, although the distance they migrate varies widely among the world’s various subspecies. Travelling throughout the course of the year — between their winter and summer habitats, between their fawning grounds and the habitat used during their sexual activity (or rut) — caribou never stop moving!

Caribou and reindeer are actually close cousins. They belong to the same species, known to biologists by its scientific name: Rangifer tarandus. Generally, we refer to the animals of this species living in North America as caribou; those living in Eurasia are known as reindeer.

There are a number of unique characteristics that set caribou apart from other animals in the cervidae family and help them survive the northern climate. The wild caribou population is estimated at 5 million throughout the northern hemisphere. They live in herds of greatly varying size. In addition to this enormous population, there are approximately 2 million semi-domesticated reindeer, found mostly in Europe and Asia.

*Worldwide Distribution of Caribou (Rangifer Tarandus)*

- Woodland Caribou (Rangifer tarandus caribou)
  1. George River Herd
  2. Rivière aux Feuilles Herd
- Barren-Ground and Grant’s Caribou
  3. Qamanirjuaq Herd
  4. Beverly Herd
  5. Bathurst Herd
  6. Bluenose Herd
- Barren-Ground Caribou and Peary Caribou
  7. Porcupine Herd
  8. Western Arctic Herd
  9. Mulchatna Herd
- Peary Caribou (R. t. pearyi)
  10. Tailyn Peninsula Herd
- Wild and Semi-Domesticated Caribou (R. t. tarandus)
- Wild Forest Reindeer (R. t. fennicus)
- Svalbard Caribou (R. t. platyrhynchus)

* Numbered herds count more than 100,000 individuals.
  Caribou introduced to the Kerguelen and South Georgia islands in the Antarctic do not appear on this map.
**Antlers**
Antlers are structures made of bone-like material, weighing up to 7 kilograms (15.4 pounds) on males and 1 kilogram (2.2 pounds) on females. They fall off when they are no longer needed, and the caribou grow a new set each year.

**Power under the Hood!**
A highly developed circulatory system gives the caribou spectacular performance and an extremely high VO_{2max}. A caribou can travel at 40 kilometres per hour (24.9 miles per hour) for over an hour, or swim dozens of kilometres (or miles) without really getting tired. Staying with the rest of the group and avoiding predators takes lots of stamina!

**Guaranteed Flotation**
As a bonus, caribou fur provides flotation! The taiga and tundra are covered with lakes and rivers. Their fur helps them cross the many bodies of water they encounter during their annual migration.

**Well-Heated Caribou Never Worry about Cold Water**
To counter the effects of extreme cold, caribou blood temperature can vary from one part of the body to another. This cuts down on loss of body heat. The difference is most striking in the legs. Some of the heat from blood headed towards the legs is recovered and redirected elsewhere in the body. As a result, the temperature of the legs can drop to near the freezing mark without causing the caribou any discomfort. By lowering the biological thermostat in their legs and conserving heat where it counts, caribou are well prepared to face the cold.

**An All-Weather Coat!**
Caribou fur consists of two layers of hair. The exterior layer is made up of protective hairs, shielding the caribou from rain, wind and foul weather. The shorter and finer second layer lies in between the outer hairs. The hair in this second layer provides insulation, keeping the animal warm. The coat envelops the caribou with warm air and fur, allowing it to remain comfortable in temperatures below -40° Celsius (-40° Fahrenheit)!

**All-Terrain Legs**
Caribou legs provide near-tireless propulsion for long journeys through forest and mountains, as well as for racing across northern terrain. They are also powerful oars, allowing the animals to swim at speeds of up to 11 kilometres per hour (6.8 miles per hour). In winter, the bottom of their feet is covered with hair providing insulation and traction. The hooves, which are in fact the caribou’s nails, grow longer in winter in order to put maximum distance between the rest of the leg and frozen ground.
Chapter 3

TUKTU’S LONG JOURNEY

It’s early June on the tundra. We are on a plateau near the George River. This inhospitable-looking region of northern Quebec is a traditional calving ground for the world’s largest caribou herd. Tuktu, the caribou we meet in the film Great North, is born here.

As soon as Tuktu is born, she is washed by her mother, who licks her all over and then gives her milk to drink. The days are long and the air is warm. Tuktu’s fur dries in the Arctic sun. She has everything she needs to feel comfortable after her birth. Already, Tuktu’s curiosity is driven by an instinct to become familiar with her environment. Just a few hours after birth, Tuktu is on her feet and ready to follow her mother. She feeds, and listens carefully to recognize her mother’s call — she and her mother have to get to know each other! Their mutual bond will help make sure they don’t lose each other among the thousands of other caribou in their herd. Tuktu’s long journey is about to begin…

In July, at the age of one month, Tuktu discovers creatures that are more powerful than a wolf’s fangs, more persistent than the Arctic wind and more numerous than the world’s human population: stinging insects. During the next few weeks, Tuktu will be harassed, chased and ambushed in the swamps and peat bogs of the North by mosquitoes, blackflies and warble flies. Some will pierce her skin to drink her blood. Others will lay eggs in her fur. The larvae that hatch from the eggs will pierce her skin or burrow into her nostrils and stay there, sheltered, for the next 10 months!

To avoid insect attacks, caribou gather in groups, with up to 100,000 animals together on a hillside. They act as one gigantic organism, living with a single purpose: to escape from the nightmarish flies. An Inuit expression springs from this behaviour: “There are so many caribou that the mountains are moving.” It is a horrible time for Tuktu. She sticks by her mother’s side, hoping it will be over soon. Her mother looks for a breeze at the hilltop or a slab of snow from last winter that will allow them to escape from the insects. Sometimes they find refuge by the ocean, in Labrador, or in the Torngat Mountains.

Finally, in August, cooler weather arrives — putting an end to the mass insect attacks. The big groups of caribou break up. Tuktu is now several hundred kilometres (or miles) from the place of her birth. Life is calmer now. Tuktu is well-fed, drinking her mother’s milk and eating twigs, nice green leaves and lichen. What a greedy guts! From mid-October into November, it’s rutting season. Since the summer, each male has been sporting an enormous set of antlers, now hardened by the sun and wind. Now, the males confront each other to show their dominance and their right to keep a group of females — their harem. Tuktu’s mother will be part of one of these harems. She watches the males as they parade in front of the females — and, more importantly, their male rivals — with their oh-so-impressive antlers. This ritual usually means the males can avoid out-and-out combat because the presence of their massive antlers is a disincentive violence. Nevertheless, there will be some violent combat, and every year some of the males will die as a result. Others will be weakened by the effort.
After the mating season, the males lose their antlers. At the end of this period, mother and daughter continue their long march southward — deep into the taiga, and then on farther south into the boreal forest. The caribou will arrive at their wintering grounds — the southernmost reach of their travels — in December. Here, they are sheltered from the winds that ravage the tundra, and they have a far better food supply. Tuktu’s mother digs holes in the snow, called feeding craters, so she can gain access to lichen that will feed herself, Tuktu and the fetus she has been carrying for the last few weeks. The long journey never ends, not even in the middle of winter. It does, however, slow down. The dangers Tuktu has to face now include wolves, hunters and ice. The aurora borealis, or northern lights, abound in this region. Winter is long and cold but “fortunately without flies!” Tuktu probably thinks.

Spring arrives. Ice melts on lakes and rivers, making caribou travel harder. The rising temperature is a sign of spring — but an even stronger sign is the signal Tuktu’s mother receives from her new fetus, urging her to return as quickly as possible to the fawning grounds. Spring migration has begun. With her incredible navigation skills, Tuktu’s mother will cross vast swathes of territory to return to the spot where her herd has given birth for centuries. Tuktu still follows her mother, but does not stay as close to her all the time. She has been weaned for several months now, and will soon have to start thinking more for herself.

The long journey back to the calving grounds is fascinating. Tuktu’s herd — known as the George River herd — covers 800 000 square kilometres (308,882 square miles) every year. That’s an area the size of France and Italy combined. In June, the females pack into the calving ground, which covers a mere 49 000 square kilometres (18,919 square miles) — an area the size of Holland! Tuktu’s mother prepares to give birth. She chases Tuktu away, because her new fawn is going to require a lot of her energy in the coming weeks.

This has been a crucial first year for Tuktu. She has grown up at her mother’s side, and her mother has passed on to her knowledge she will use for the rest of her life — which she will one day pass on to her own fawns. One day, like other gravid females, Tuktu will have the vital responsibility of leading her group to the calving grounds. Over the course of the year, Tuktu’s body has undergone many changes. The soft brown fur she had at birth has become thicker and turned a grey/brown colour that is pale in the winter and darker in the summer. Her antlers have started to grow. A small, thin branch, with no forks, is visible during the first year. She will lose it in June. Then, every year, she will grow a new set of antlers between August and the following June. She will use them to protect a feeding hole during the winter and defend her young from predators.

How many years will Tuktu live? Good question! On average, caribou live six years. During that time, Tuktu will keep up her annual migratory cycle — moving through the northern landscape in search of better feeding grounds, escaping from predators and reproducing. She will probably travel 48 000 kilometres (18,533 miles) during her six-year life span. If she does not fall prey to a predator or a hunter, she may well live 12 or 13 years and travel 96 000 kilometres (37,066 miles). That’s like circling the Earth three times!
Chapter 3

Glossary

1. **Cervidae:** Family of ruminants with branched horns (also called antlers) on their head. The antlers fall off every year at a particular time. Other members of this family include moose, wapiti and white-tailed deer.

2. **Circumpolar:** Found around one of the Earth’s poles.

3. **Rut:** Breeding period among mammals of the cervidae family.

4. **VO₂ max:** The maximum amount of oxygen used by a mammal’s body during physical activity. This number depends on heart rate, volume of blood pumped by the heart with each beat and the amount of oxygen removed from the blood by muscle mass.

5. **Predator:** An animal that eats others as prey.

6. **Tuktu:** Caribou, in the Inuktitut language.

7. **Gravid:** A pregnant female.

Activity

Caribou Travels

**Goals:**
Understanding the caribou’s migratory cycle.

**Materials:**
1. photocopy of “Tuktu’s Long Journey” (pages 4 and 5 of this chapter) for each participant or group.
2. calendar

**Directions:**
1. Read “Tuktu’s Long Journey.”
2. Now identify six important annual periods in the caribou’s life cycle. Note them on the calendar.
3. Compare your list with the one below. These are the periods biologists use to define the caribou life cycle:
   a. Fawning (end of May to mid-June, approximately)
   b. Post-fawning aggregation (end of July to mid-August)
   c. End of summer scattering (mid-August to end of September)
   d. Rut (October to November)
   e. Wintering over (December to March)
   f. Spring migration (March to end of May)
The Growth of Caribou Antlers

During periods of growth, the antlers are a collection of fragile, spongy tissues loaded with blood vessels. At this time, the antlers are covered with soft brown hair known as velvet. Once the antlers reach their full development, blood stops circulating in the antlers as blood vessels retreat to their base. Then the velvet dries up and falls off. The result is that for a few days, the caribou exhibit bloody-looking horns. The blood will slowly dry, giving the antlers their characteristic brown colour. The antlers will whiten over time, due to the effects of sun and weather.

Let's Explore Some More:

4. Write the letter beside each of the annual periods in the appropriate boxes on the map below.

5. Using the scale below, calculate approximately how far Tuktu travels in a year.

Solution on page 8
Chapter 3

I Dig, You Dig, We Dig…

The first French explorers in North America discovered a strange animal. The Native Mi’kmaq (Micmac) people called it xalibu; Europeans pronounced it caribou. The name means “shoveller” or “slogger” — and it comes from the caribou behaviour of digging holes in the snow. During the winter months, a caribou will dig up to 50 of these feeding craters per day, in order to find the five or six kilograms (11 to 13.2 pounds) of lichen that it requires.

Questions:

What do caribou do to combat the cold? What do you have to do to stay warm and conserve energy in your own home?

How do the caribou manage to find their bearings and know which way to go? How do you find your way where you live — in your city or town, or in the countryside?

Why do caribou migrate? Have you ever migrated? What impact do mosquitoes and other stinging insects have on the caribou? What impact can they have on you?

SOLUTIONS: 4. Map

5. Approximately 2 400 kilometres (1,491 miles). Caribou don’t migrate in a straight line, and they have to make many detours around obstacles in the tundra. So the actual distance Tuktu travels may in fact be quite a bit higher — as much as 4 000 or 5 000 kilometres (2,485 or 3,107 miles)!

Resources

BOOKS

WEB SITES
Human Role in Caribou/Reindeer Systems: www.dartmouth.edu/~arctic/rangifer/index.html
A good fact-sheet on caribou from the Canadian Wildlife Service www.cws-scf.ec.gc.ca/hww-fap/caribou/caribou.html
Caribou Québec: www.caribouquebec.qc.ca
The Inuit

Getting to know the Inuit people
Discovering the oral traditions of the Inuit
Understanding the links between the Inuit, the natural world and the caribou
THE INUIT, YESTERDAY AND TODAY

Who are the Inuit?

If there is anyone on Earth deserving the title “people of the cold,” it’s the Inuit. Once known as Eskimos, they are now referred to as Inuit — the name they have always used to describe themselves. In their language, Inuit means simply “the people.” The Inuit number approximately 145,000 people. They live in communities scattered throughout northeastern Russia (the Chukotsky peninsula), northern Alaska, all of northern Canada and the coastal regions of Greenland.

Although they share a common past, the status of the Inuit varies from one region to another. In Quebec, the territory the Inuit inhabit is called Nunavik (which means “our land”). The Inuit of Nunavik have a similar status to other Quebeckers, but they also benefit from the James Bay Northern Quebec Agreement — which gives them exclusive hunting and fishing rights over part of the territory and financial compensation in exchange for territorial rights. The recent creation of the territory of Nunavut in Canada’s eastern Arctic is a milestone in Inuit history, giving the Inuit more control over their own future.

Twenty thousand years of experience have made the Inuit and their forefathers true masters of the art of survival in the Arctic climate. Their entire culture has been forged not in fire, but by cold: their sense of sharing, unique spiritual practices, rich oral tradition and knowledge of the environment are the result of thousands of years of adaptation to their surroundings.

In Great North, the Inuit people are represented by Adamie Inukpuk and his family and by the voices of women practicing katajak or throat-singing. Inuit traditional culture has not disappeared. Far from it. But for the most part, the Inuit live in settlements now and not solely off the land. They work at a range of jobs: manager of the local co-op store, for instance, or bush pilot flying visitors out over the tundra to see the caribou.
Where did the Inuit come from?
Archaeological digs seem to indicate that the Inuit are descendants of an ancient people known as the Thule. The Thule people originated in the coastal region of the Bering and Chukchi seas, off northern Alaska, and likely arrived in the islands of Canada’s Arctic 600 to 1,000 years ago. They excelled at hunting marine mammals — especially the bowhead whale. These creatures, which are 15 metres long and weigh 50 000 kilograms (110,230 pounds), were hunted from craft known as umiak.

The Thule gradually moved eastward in search of new sources of food and a more amenable environment. Their journeys eventually took them across to all of the Canadian Arctic coast and islands and onward all the way to Greenland. Wherever they went, they brought with them new tools, such as the dogsled. This theory still leaves a number of questions unanswered. The regions that the Thule moved into were already populated by the Dorset people. Did the two peoples ever encounter each other? Was there conflict between them? The Dorset, who the Inuit refer to as Tunit, were known for their spirituality and their ability as sculptors — and they were probably the creators of the igloo. What happened to them? Why did they disappear? For now, we have no answers.

What are some examples of Inuit adaptation to life in the Arctic?
The igloo is perhaps the most famous symbol of adaptation to life in the Arctic — but it is also a symbol of the past. However, many other ingenious accommodations to this harsh climate are still in evidence today. The Inuit invented the dogsled (called qamutik). Today, it’s more likely to be hauled behind a snowmobile than pulled by dogs — but it’s as useful as ever. Interest in huskies (Eskimo dogs) continues to grow as northern sports and tourism become more popular. The kayak, once used for hunting, is now a mainstay of paddlesports.

Innovations still take place in the Arctic. Homes in northern communities are built without foundations. They rest on posts sheltered from the permafrost, which could damage them as the topsoil freezes and thaws. Regular plumbing is impossible, since the pipes would freeze. Each municipality provides drinking water and sewage removal by truck. The Inuit have changed their way of life dramatically because of contact with the modern world. In only 100 years, they have had to get up to speed with a civilization that took thousands of years to develop to its current state. Inuit ingenuity has helped see them through these turbulent times. For instance, you may hear about an Inuit fisherman repairing a fancy new fishing reel with a carefully carved piece of caribou antler, or about throat singers on a sold-out European tour.
What roles do the Inuit play in their communities today?
Think of a traditional Inuit family as a small business in which everyone played a crucial part. A hunter could not go hunting for days on end without clothing made of caribou and seal skin, carefully sewn by the family’s women and girls. Without their efforts, he would die of cold. Women collected eggs, mussels and seaweed. Whole families worked together fishing — building weirs to trap arctic char as they returned to fresh water at the end of summer. The fish were of critical importance to feeding the family before the onset of winter, and everyone helped out catching, cleaning and storing them.

Everybody also pitched in to prepare the summer camp (a tent or a shelter built partly underground), as well as the winter igloo. Everyone took part in spiritual practices involving a shaman, whose role it was to mediate between the visible and invisible worlds. Through the shaman, spirits could let their wishes be known to hunters and decide the fate of those who had transgressed the community’s cultural values.

Today, with the spread of market economics and with access to services from the south, Inuit roles have become more diversified. Now you can find Inuit pilots and police officers, for example. While greater contact with the south may have brought some benefit to the Inuit, it has also meant the disruption of traditional ways of life. Furthermore, the introduction of Christianity has caused many to forget Inuit spirituality. Christianity has become a permanent part of Inuit culture, but there has been a resurgence of interest in traditional spirituality in the last few years.

LANGUAGE AND TRADITIONS
What language do the Inuit speak?
The Inuktitut language — a member of the Eskimo-Aleut family of languages — lies at the heart of Inuit culture. There are five different types of Inuktitut spoken in the territory stretching from Alaska to Greenland: two in Alaska, two in Canada and one in Greenland. In addition to these languages, there are many dialects and regionalisms. As a result of thousands of years of isolation, certain languages may share only a few words.

Today, the use of Inuktitut varies from one region to another. In areas where it is part of daily life, the Inuit have adapted it by adding words reflecting current realities. The Inuit did not have a written language until one was developed by an Anglican missionary, the Reverend E.J. Peck. He introduced a syllabic guide, which at first numbered 45 symbols, in 1885.
This system of writing is based on the sounds of syllables in the Inuit language, and is in use primarily in the Eastern Arctic (with the exception of Greenland).

With aboriginal languages around the world endangered, great efforts have been made to preserve the Inuit language, including teaching it in school and using it in public. New Inuktitut words have appeared, to reflect new realities. Inuktitut dictionaries and magazines are being published. And Inuit translators and public speakers help link the North with the rest of the world. In Quebec (Canada), for instance, Inuktitut is the main language of education from Grade 3 on. Students then choose either English or French as a second language.

What role does oral tradition play in Inuit culture?
Oral tradition is absolutely essential to Inuit culture. Legends, songs (including throat-singing), conversations around a freshly hunted seal and meetings of community members are only a few of the manifestations of Inuit oral culture. Television, newspapers (such as the Nunatsiaq News) and the Internet are recent expressions of Inuit culture — along with local and international events, conferences, festivals and the Arctic Winter International Games, a colder version of the Olympics!

Local radio is also very important. Every community in the North has its own local radio station. Serving as a direct link among members of the community, these stations broadcast music, news and greetings; they are an up-to-date example of oral culture in action. For their part, the elders feel bound to transmit their own stories, values, language and art to the youth of their communities — either at family events or through the schools. Tales and legends convey current and past events, heroic exploits and mythology. Through them, future generations will learn about their culture and spirituality, along with its values. Part of this process includes learning timeless arts like igloo building, hunting techniques and ways to survive on the tundra.

Inuit artists and artisans in many fields (such as music, painting and sculpture) continue to innovate while remaining true to their culture. Throat-singing and soapstone culture have become easily recognizable symbols of the North — valued around the world for the glimpse they offer into a radically different culture, as well as for their quality and style.

RELATIONSHIP WITH NATURE
What kind of relationship do the Inuit have with the natural world?
For most of their history, the Inuit have depended on animals for their survival. Their diet and clothing came almost entirely from animal sources — not surprising, given the rarity of edible plants in the Far North. The bearded seal offered
waterproof skin ideal for boots; caribou pelts and eider down made for excellent coats; walrus ivory served for tool handles and sacred objects.

As a result, the Inuit developed a deep respect for the natural world; their values and beliefs always reflect the close and fragile relationship between humans and the natural world. If he respected nature, an Inuit hunter would be able to harvest a caribou or seal for his community. On the other hand, a disrespectful hunter might suffer terribly or even die as a result of his actions.

Today, the Inuit have become defenders of their environment—an environment that captivates those who visit the region, whether they come as ecotourists or explorers—or filmmakers! Even though access to goods and services from the south is now easy, they do not come cheaply. The cost of shipping (by boat or plane) generally triples their price. So the land remains of crucial importance to Inuit culture. Subsistence hunting, fishing and collecting sea-bird eggs are still important food sources for many.

What is the relationship between the Inuit and the caribou?
Caribou are in constant migration between the tundra and taiga, so their role in Inuit life is sporadic, but nevertheless extremely important. In the past, caribou represented a renewable source of pelts, meat, bone and antlers—all essential for making tools and clothing that could be used throughout the year.

Caribou pelt was highly prized for its insulating qualities. Even in this age of high-performance synthetic fabrics, it remains one of the best materials available for warding off the cold.

Although manufactured goods such as knives, rifles and needles are now readily available for purchase in the North, caribou continue to play an important role in Inuit culture. They remain an important food source, of course, but their influence runs far deeper. For instance, the traditional Inuit calendar does not feature holidays like Halloween or Valentine’s Day. Instead, you will find Nurraliut (caribou birth), Akunnaituq (the time when caribou pelts are perfect for making clothing) and Amirajaut (shedding of caribou antlers). And in traditional astronomy, the Big Dipper is seen not as the Great Bear, but as tukturjuk, a name related to tuktu, the Inuit word for caribou.
Playing Inuit

Goal:
Becoming familiar with aspects of Inuit culture.

Material:
Ruler or tape measure (optional)

Note:
This activity requires adult supervision!

Directions:
1. Explain to participants that games play an important role in Inuit culture. They were traditionally used to practice skills or while away time in the igloo while a storm raged outside. Many games, like this one, involve physical endurance.

2. Divide the group into teams of four each.

3. One member of each team lies face down on the ground in a cross shape — feet together and arms outstretched. One of the other team members stands by the feet, while the others stand beside each arm.

4. The participants standing by the arms lift them by grasping the wrists. The person standing by the feet grasps the ankles. Together, the three slowly lift the person on the ground 15 to 20 centimetres (6 to 8 inches) off the ground. The person being lifted must keep arms and legs straight and not touch the ground.

5. The three “carriers” walk forward slowly until the person being carried has to bend his or her arms or legs.

6. Everyone returns to the starting point and switches roles, letting everyone take a turn at this demanding exercise.

7. You can also measure the distance each team travels if you like.

Glossary

1. **Eskimo**: An old word used to describe the Inuit. It comes from the American Indian Montagnais tribe, who called the Inuit Estmeow — meaning others, or strangers. The word was quickly adopted by European visitors in the Gulf of St. Lawrence. It remained in usage until recently. Today, the word Inuit is more accepted, although Eskimo is still widely used in the United States.

2. **Nunavik**: Region of northern Quebec (Canada), covering an area of approximately 500,000 square kilometres (193,050 square miles). Nunavik is primarily inhabited by Inuit living in 14 coastal communities.

3. **Nunavut**: Inuit territory located in the Canadian North. Nunavut was formally established on April 1, 1999, and is administered by a territorial government. The capital is Iqaluit. Baffin, Ellesmere and Devon islands are among its best-known regions.

4. **Ecotourism**: A range of tourist activities (such as sports, birding and photo safaris) that take place in a natural setting, while respecting the environment.

5. **Subsistence**: Staple supplies and objects allowing individuals to meet their basic needs.
Chapter 4

Let’s Explore Some More:

8. As a group, read the different letters and symbols (below) that make up the Inuit language. The symbols represent letters of the Roman alphabet (which we use in English) and are called syllabics.

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9. Using syllabics, write the following words:

Example: **Nanuq**: _______ (pronounced “nanook,” meaning white bear)

1. **Aput**: __________________________ “apoot” snow

2. **Tuktu**: __________________________ “tooktoo” caribou

3. **Ai**: __________________________ “ai” hi

4. **Nakurmiik**: __________________________ “nakurmiik” thank you

5. **Qajaq**: __________________________ “kajaq” kayak

6. **Qajaujuq**: __________________________ “kaya-ooyook” straightening up with a quick paddle stroke after having capsized in a kayak.

7. Try writing your own name using syllabics: __________________________

_Solutions on page 9_
Questions:

Does an Inuit hunter have to wait a long time before being able to capture a seal? Have you ever had to wait a long time for someone or something? What did you feel while you were waiting?

What is unique about Inuit culture? What culture do you come from? In what ways does it differ from Inuit culture?

Over time, how have the Inuit adapted to the cold climate? Have you ever had to adapt to cold conditions? What did you do?

Why did the Inuit need physical games? Do you know any games that help keep you in good shape? Do you need games to become more alert or stronger?

Solutions:

1. ▶ ▶ ▶
2. ▶ ▶ ▶
3. ▶ ▶
4. ▶ ▶ ▶
5. ▶ ▶ ▶
6. ▶ ▶ ▶

Note to group leaders:

Some answers may differ from those shown in the solutions, but may still sound correct. Not to worry — your groups just need to brush up on their Inuktitut grammar!

Resources

CD-ROM

Books

Web Sites
Official site of the Government of Nunavut: www.nunavut.com
Avataq Cultural Institute: www.avataq.qc.ca
Inuit Circumpolar Conference: www.inusiaat.com
Nunatsiaq News: www.nunatsiaq.com
The Saami

Discovering the history of the Saami people
Learning about the Saami way of life
Understanding the relationship between the Saami and their environment — in particular, reindeer
THE SAAMI, YESTERDAY AND TODAY
Who are the Saami?
The Saami (once referred to as Lapps) are the indigenous people of the Scandinavian Arctic. Their territory, known as Sápmi, extends through four different countries: Norway, Sweden, Finland and Russia (Russia’s Saami live in the Kola peninsula at the country’s northwestern extremity). There is no such thing as Saami citizenship. Each Saami is a citizen of the country he or she was born and/or resides in. However, the Saami people have had their own flag since 1986, and they celebrate a national holiday on February 6.

The Saami population is currently estimated at about 77,000 people: 50,000 in Norway, 20,000 in Sweden, 5,000 in Finland and 2,000 in Russia.

Where did the Saami come from?
Good question! According to the Saami themselves, they have always inhabited the region they live in now. Some researchers think that the Saami arrived after the last ice age, more than 10,000 years ago. Others believe that the Saami were already there at the time of the last ice age, living at the edges of the glaciers.

One thing is for sure: their first settlements were along the coast, where they lived primarily by hunting and fishing. From the sea came fish, seals and whales. About 8,000 years ago, some of these coastal inhabitants settled in the interior, perhaps following retreating glaciers — which created a favourable environment for wildlife. They came across large migratory herds of wild reindeer, and wasted no time building lines of pits into which the reindeer would tumble come autumn. These lines are sometimes several kilometres (or miles) long. Over time, they would come to be used collectively, by several different groups of families. Eventually, small communities made up of ten or so families began to appear. These groups are known as sijdas. Within a sijdaa, reindeer hunting is done collectively, while each family is given a particular territory in which to hunt (moose, beaver and ptarmigan) and fish (northern pike, salmon, trout). Whatever they catch is shared by the whole group.
Chapter 5

How did the Saami domesticate reindeer?
About 3,000 years ago, the Saami managed to train reindeer, using them as lures to attract wild reindeer into their pit lines. They also used them to transport merchandise, as draught animals, and for milking. While reindeer do not produce much milk, their milk makes up in richness what it lacks in volume.

During the Middle Ages, Scandinavian monarchs coveted the riches of Saami territory. They declared the Saami to be citizens of their respective countries, in an effort to affirm their right to Saami land. The Scandinavian nations imposed taxes (which were collected by travelling merchants) and set about trying to convert the Saami to Christianity. Christianity caused a major culture shock: it ran almost entirely counter to Saami spiritual practices, which were based on shamanism.

During the 17th century, the Scandinavians began colonizing Saami territory in earnest. Deprived of the use of part of their traditional land — and taxed as well — the Saami could no longer live off hunting and fishing alone. The arrival of outsiders had increased the sale and barter of reindeer meat and other products — making it more profitable than ever to raise reindeer. So the Saami took to large-scale reindeer herding as their main source of income.

What is Saami life like today?
During the 18th and 19th centuries, the process of colonization continued. Mines, forests and waterways began to be exploited commercially. Official borders were demarcated among various northern nations, with no regard to the interests of indigenous people. All of this activity nibbled away at Saami lands.

By the start of the 20th century, a number of different laws governed the Saami. They were usually divided into two categories: those who were nomad herders and those who were settled. The settled Saami were gradually integrated into the dominant culture, while the nomads maintained their traditional role.

The mid-20th century saw the re-emergence of Saami identity. The Saami began taking collective action to overcome oppression. Many Saami organizations came into being at this time, including the first Saami parliament, in Finland, established in 1973. Since then, the Saami have worked to increase awareness of their values and traditions and take their place as full members of the international community.

Other Reindeer Herding Populations
All across the Russian Arctic there live peoples who have domesticated reindeer. Moving across Siberia, from west to east we meet the following peoples:

The Nenets remain nomadic, travelling throughout the year along with their herds. They and the Saami are considered the world’s greatest reindeer herders.

The Yakuts raise horses and cattle along with reindeer.

The Evenki keep smaller herds, used primarily for transportation rather than food. They ride the reindeer like horses, saddle included.

As for the Chukchi, they are divided into two groups: people of the sea and people of the reindeer. The two groups live symbiotically, exchanging complementary products.

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REINDEER AND THE SAAMI

What is the role of reindeer in Saami culture?

At one time, only 10 or 20% of the Saami were reindeer herders. The Saami also practiced fishing, hunting and agriculture. But over the course of the centuries, reindeer herding came to be closely identified with Saami culture. Today, the lives of most Saami revolve in some way around reindeer.

In the past, Saami reindeer herders migrated along with their animals. They travelled on foot or by ski, carrying light tents. Summer was spent in the mountains or along the Atlantic coast. Once autumn came, they followed the reindeer north to the coniferous forests, which offer shelter and are more readily available food through the winter. Some Saami ranched in more wooded areas. They travelled only short distances over the course of the year, staying within their own community’s territory.

Today, modern tools, such as like radio telemetry, helicopters and snowmobiles, have changed reindeer herding dramatically — but for the Saami, the rhythms of life are still closely tied to the reindeer life cycle.

Reindeer are born in May. The next few weeks are a quiet period, which herders use for repairing their homes or camps and any land or equipment associated with herding (fields, fences and so on). At the end of June, it is time to gather the herd together and brand the fawns. September is rutting time, and males — big and fat after a summer of grazing — are selected for slaughter. Once the snows have fallen in November and the reindeer have begun grazing on lichen, it is time to gather them together into several smaller groups and drive them to their wintering grounds. They will stay there until April, when it is time to return for calving.

While most Saami have some connection with reindeer herding, there are some groups who have less to do with it. These include the Saami of the northern Scandinavian coast, who make their living primarily by fishing in the waters of the Arctic Ocean.

Do the Saami today live just from reindeer herding?

Saami culture is based on using available natural resources to meet basic needs. This requires close observation of nature and animal behaviour. Reindeer herding, hunting, fishing, gathering wild plants and craftsmanship are traditional Saami livelihoods. Generally, the Saami combine several of these activities, along with agriculture (which is less significant), in order to live comfortably.
Culturally and economically, reindeer herding remains the most important source of Saami revenue. There are more than 400 words in the Saami vocabulary to describe reindeer according to age, type, colour, shape and so on. While much of the population is still involved in reindeer herding, herds have had to increase in size (to over 400 head) in order to remain profitable.

To make ends meet, many Saami also work in service industries — particularly tourism. They also work in the mining, forestry and hydro-electric industries.

The Saami economy remains fragile. Nearly 100,000 reindeer were contaminated by radioactive fallout from the 1986 Chernobyl nuclear disaster. About 30,000 had to be destroyed.

**ARTS AND TRADITION**

What is the role of oral tradition in Saami culture?

Oral tradition is absolutely central to Saami culture — particularly since writing did not appear until the 17th century. Elders’ memories and knowledge are passed down through song, story and legend. One of the best-known Saami cultural traditions is jojk (pronounced yoik). Jojk is a type of song based on a particular vocal technique and using melody, rhythm and simple words to describe or “sing” a person, animal or event. Jojk is a complex musical form — especially since a particular piece can be sung in different tones, depending on the singer’s mood and the jojk’s theme. So jojk performance is highly personal. It has also had a strong influence on contemporary music.

Nine Saami dialects are generally recognized. Some share a similar alphabet, while others have nothing in common. At one time, the Saami were forbidden to speak their language, and they were educated only in the language of their country of residence. During the 20th century, this changed, and there has since been a renaissance in Saami communications. There are now five Saami-language newspapers, as well as Saami radio broadcasts.

What are Saami arts and crafts like?

Saami traditional art is marked by the use of natural materials. It is inspired by daily life among a population constantly on the move — meaning that objects must be easy to transport. The Saami use bone, wood, antlers, animal skins, leather, roots, wool and beads for making tools and clothes for personal use as well as for sale. Clothes are embellished in a personalized way, while traditional costumes show where the wearer comes from.
Decorative arts combine the ancient traditions and beliefs of many Scandinavian populations, such as the Vikings, as well as those of other peoples who came from the East.

Saami visual art is also largely inspired by ancient rock paintings — some more than 6,000 years old — found throughout Sápmi. These simple paintings depict the natural world, animals, humans and deities.

Tell me about Shamanism among the Saami.

Up until the 16th century, shamanism played a central role in Saami society. Because of their way of life, the Saami were very much in touch with their environment and with other living creatures. Plants and animals were seen as evidence of the power and goodwill of the gods.

It was of vital importance to stay on good terms with the spirits of the natural world. To please them, the Saami would sacrifice a reindeer, fish or other creature before or after an important occasion, such as a hunt, illness, birth or death. If necessary, a shaman (or noadjdde) was called upon to act as an intermediary between the human and spirit worlds.

In order to encounter the powers of the other world, the shaman used his drum and sang jojks until he entered a trance. In this state, he would travel to the world of the gods, with whom he would negotiate on behalf of his people. He was helped on the journey by various guides of the spirit world, including birds, reindeer and fish.

The drum was not exclusively the shaman’s to use. Each family had its own drum, which allowed the head of the family to see the future. The drum hung in their cabin from a spot considered sacred.

Shamans were the target of Christian persecution. Without shamans as spiritual guides, Saami religion became a blend of shamanism and Christianity. Eventually, though, the process of conversion prevailed. Today, most Saami are Christians.
Glossary

1. **Symbiotically:**
   Living together, to mutual advantage.

2. **Trance:**
   Hypnotic or ecstatic state entered into by someone (such as a shaman) on an out-of-body journey to another world.

---

**Activity**

**Sijdda Life:**
A Collective Business

**Goal:**
Understanding the importance of community in a territory with limited resources.

**Material:**
108 cards, each with the name of one resource
6 copies of the following list of items (some are a combination of two other items):
   - Herbs, Berries, Moose, Beaver, Ptarmigan, Cod, Salmon,
   - Skis (Wood and Knife), Clothing, Blanket, Drum (Thread and Skin), Reindeer, Silverware, Sacrifice (Antlers and Shaman)
5 copies of the following text, which sets the scene:
   "You live in a sijdda in which each family brings its own expertise to the community. It’s time for the big annual gathering in Jokkmokk. Your family has to acquire the items it will need to be properly prepared for this long journey. Since it is not easy to acquire everything you will need in a territory with limited resources, you will have to exchange resources with other families in your sijdda. It would also be wise to earn the protection of the spirits that watch over your journey by sacrificing reindeer antlers under a shaman’s supervision. Before leaving, make sure to give your delegates enough money to pay the taxes you owe to the national authorities in Jokkmokk."

1 copy of the above text, with the following sentence replacing the last sentence above:
   "Before leaving, make sure you have collected the tax money from all of the families in the sijdda, since you have to turn it over to the national authorities in Jokkmokk."

*This copy will be given only to the delegates’ family.*
**Chapter 5**

Explain that the goal is for each family to be ready for the journey to the annual gathering at Jokkmokk. Encourage the families to exchange resources among themselves in order to achieve their goal. In addition, the delegates’ family must collect the tax money from the other families. They do not have to barter any resources for the tax money.

**Directions:**

1. Make six photocopies of the “Resources” column in the table below. Cut out each of the resources to make 108 cards. You will have 6 copies of each of the 18 resources (6 x 18 = 108).

2. Review and contextualize the concept of *sijdda* with participants.

3. Divide the participants into six groups; each group will be one family.

4. Give each group a copy of the text that sets the scene.

5. Give each team a copy of the item list. Emphasize that each family must obtain one item from each of the resources (for example, a card marked “Berries” is one item).

6. Give each team 18 resource cards, distributed as follows:

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<tr>
<th>RESOURCES</th>
<th>FAMILIES</th>
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<tr>
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<td>Fishers*</td>
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<td>Cod</td>
<td>5</td>
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<tr>
<td>Thread</td>
<td>5</td>
</tr>
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<td>Salmon</td>
<td>6</td>
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<tr>
<td>Herbs</td>
<td>-</td>
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<tr>
<td>Wood</td>
<td>-</td>
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<tr>
<td>Berries</td>
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<tr>
<td>Ptarmigan</td>
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<td>Moose</td>
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<tr>
<td>Beaver</td>
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<tr>
<td>Reindeer</td>
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<tr>
<td>Antlers</td>
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<td>Hide</td>
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<tr>
<td>Blanket</td>
<td>-</td>
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<tr>
<td>Knife</td>
<td>-</td>
</tr>
<tr>
<td>Clothing</td>
<td>-</td>
</tr>
<tr>
<td>Silverware</td>
<td>1</td>
</tr>
<tr>
<td>Shaman</td>
<td>-</td>
</tr>
<tr>
<td>Money for Taxes</td>
<td>1</td>
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</tbody>
</table>

* For example, a family of fishers would be given the following cards: 5 cod, 5 thread, 6 salmon, 1 silverware and 1 money for taxes.
Chapter 5

Let's Explore Some More:

7. Using the definitions below, unscramble the words and write them into the grid. The letters in the shaded boxes form a phrase the Saami use to describe themselves.

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<td>NMATEILPRA</td>
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<td>EREDRINE</td>
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<td>UECSOTM</td>
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<td>AANACSDNIIV</td>
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<td>MHSASISIN</td>
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<td>RDMU</td>
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<td>21.</td>
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<td>RHDNIGE</td>
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</tbody>
</table>

Note:
Clues are given in anagram form. Unscramble them and write the answers into the grid.

1. AIMPS What the Saami call their territory.
2. EACNRT Altered state into which a shaman enters in order to be able to communicate with the gods.
3. JJKO Traditional Saami song.
4. PLASP Name by which the Saami used to be known (plural).
5. NMATEILPRA An important democratic institution; the Saami established one in Finland in 1973.
6. EREDRINE This animal plays a crucial role in Saami culture.
7. UECSOTM Traditional clothing that indicates what region a Saami comes from.
8. HFGIIISN Traditional method of obtaining food from rivers, lakes and the sea.
9. AVNSETI Original inhabitants of a region (plural).
10. NHNGITU Traditional method of obtaining food on land.
11. NETT Temporary shelter used by Saami while travelling.
12. HEWAL Large sea mammal traditionally caught by some Saami.
13. IKSS A way of getting around in the snow (plural).
14. GHTEAIRN Traditional method of collecting plants, herbs and fruit.
15. ADDJS Grouping of several Saami families into a small community.
16. ACEIGE Geological period during which glaciers spread southwards (two words).
17. LTEARNS Branched horns of a reindeer (plural).
18. AANACSDNIIV Region of northern Europe that includes Norway, Sweden, Denmark and Iceland.
19. MHSASISIN Ancient Saami religious practice.
20. RDMU Musical instrument that played a central role in Saami spiritual life.
21. RHDNIGE Method of raising and keeping animals.

Solutions on page 10
Chapter 5

Questions:

What makes Saami culture an indigenous culture? Do you know of any other indigenous peoples? How does their way of life differ from that of the Saami? How is it similar?

For a long time, the Saami were nomads. Why did they have to travel? What impact did their nomadic way of life have on their culture? Do you know of any other nomadic peoples? Why are they on the move?

Before they had a written language, what other types of communication did the Saami use? How did they transmit their culture and knowledge to their descendants? Is there an oral tradition in your family or community? How would you describe it? Is it important to you?

What other culture was also present in Scandinavia, along with the Saami? What do you know about it? Did shamanism play an important role? How would you describe your culture in a few lines?


Mystery phrase: People of the wind and sun

Resources

BOOKS

WEB SITES
An introduction to the Sami people: www.itv.se/boreale/samieng.htm
Samefolket (Sami Journal): www.samefolket.se (English)
The Sami in Finland: um1.tmt.tele.fi/finfo/english/saameng.html
Sametinget: www.sametinget.se/english/index.html (English)
Chapter 6

The Making of the Film *Great North*

Learning about the study of caribou

Discovering the secrets of how *Great North* was filmed

Understanding navigation in the North

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STUDYING THE CARIBOU WITH TELEMETRY  
CARIBOU FILM STARS  
FILMING IN THE NORTH  
GLOSSARY  
ACTIVITY: BECOME A NORTHERN FILMMAKER  
RESOURCES
STUDYING THE CARIBOU WITH TELEMETRY

What is satellite telemetry?

Satellite telemetry is an ingenious technique that uses data collected by land or water-based beacons equipped with radio transmitters. One of the best-known telemetry systems is the Argos program, jointly operated by the US and France. Argos can find the location of any beacon, anywhere in the world, to within 150 metres (492 feet). Many kinds of data can be collected and transmitted using telemetry — for example, temperature, water salinity and beacon function.

Since 1980, Argos transmitters have been placed on ships, scientific buoys and animals. Several birds, as well as land and sea mammals, are currently being studied using telemetry.

For a number of years, researchers have outfitted caribou with transmitting satellite collars, which can be used to compute the animals’ location. Since the early 1990s, partners like Hydro-Québec, Canada’s Department of National Defence, the Quebec Government’s Société de la Faune et des Parcs, and the Government of Newfoundland and Labrador, have worked together to better understand caribou migration in northern Quebec and Labrador.

Currently, about 40 caribou are fitted with working collars. Two or three satellites belonging to the US National Oceanic and Atmospheric Administration (NOAA) — and specializing in tracking weather and environmental effects — have been fitted with receivers that gather information from the caribou transmitters. These satellites travel at a speed of 27 000 kilometres per hour (16,777 miles per hour), and an altitude of 870 kilometres (541 miles). They are on an orbit that sees them pass over the poles every 101 minutes. Data received by the satellites is re-transmitted to a station on Earth, where it is captured and analyzed by computer.

Once this data has been processed, the location of the caribou becomes accessible to
researchers through a number of networks, including the Internet. In general, the location of Argos collars is known less than an hour after the satellites have flown over the caribou — who carry on happily, unaware that so much attention is being paid to their location.

Why follow the movement of the caribou?
Researchers follow the movement of the caribou to learn more about their migratory habits — and, as a result, to help with conservation.

For thousands of years, people have hunted animals as a means of subsistence. (Indigenous people still practice subsistence hunting — but today, sport hunting is popular as well.) To find prey, hunters look for signs of their passage, observe and follow their tracks, and learn as much as possible about migratory cycles. The observations made by hunters over the course of thousands of years have contributed to our understanding of the lives and habits of many different animals.

Until a few years ago, caribou researchers were limited to the same techniques that hunters use — without killing the animals, of course — to answer questions about where the animals live, what routes they follow, the number that die of natural causes and how to manage activities related to the caribou.

But advances in telecommunications and electronic miniaturization that began in the 1960s have allowed biologists to use telemetry to study animals. For years now, with the help of collars equipped with radio transmitters, researchers have been able to follow animals from a distance and receive regular updates on their location, physical condition and environment. Today, applied telemetry is used for even broader applications — providing researchers with tools they can use to answer more complex questions, and helping with ecological studies. One study, for instance, is trying to determine precisely which habitats are used by one herd of caribou.

If you think about the huge territory covered in a single year by a migrating caribou, you realize just how important telemetry is. For example, thanks to telemetry data from Argos, we know that the territory of northern Quebec’s
Chapter 6

George River herd covers more than 800,000 square kilometres (308,882 square miles). Other herds bring the total area over which caribou range in the region to over 1,000,000 square kilometres (386,102 square miles). It would be pretty hard to physically follow the tracks and traces of these animals over the course of a whole year. And that’s where satellite telemetry comes in: new technology helping science.

CARIBOU FILM STARS
How did telemetry help with the making of the film?
Everybody knows that there are lots of caribou in the North. But finding and filming them is another story! The area inhabited by the George River herd is twice the size of France. Time is short when you’re making a film; cinematographers have to act quickly to find their subjects and get the right shot. In a film featuring caribou, telemetry research comes in handy.

The logistics of filming Great North were made much easier thanks to data on caribou position supplied by the Quebec government. With access to data transmitted by radio collars, researchers could advise the film crew about the best way to find the number of animals they would need. Even with this data in hand, some scenes required hours of preparation — and waiting — before they could be captured on film.

How did the making of Great North help the caribou?
First off, Great North allows giant-screen film buffs (people like you!) to learn more about the caribou and their behaviour, and the relationships between caribou and humans. But the making of the film also helped to further our understanding of the caribou. In preparation for the calving scene, researchers and filmmakers observed and filmed many caribou births. (The animals came from northern Quebec, but were in captivity). Researchers had rarely had the opportunity to witness caribou calving in such detail.

Behind this sequence in Great North (the first caribou birth in giant-screen film) lies a project that was a whole year in the making — a very long time when you consider that the scene only lasts about three minutes! This project came into being thanks to TVA International (producers of Great North) and the Quebec government’s ministry of wildlife and parks (officially known as la Société de la Faune et des Parcs), together with partners, including the Quebec ministry of natural resources and the Saint-Félicien “Wild” Zoo, located in Quebec City.

GREAT NORTH © TVA INTERNATIONAL INC. 2000 ALL RIGHTS RESERVED
The calving scene was filmed in an experimental enclosure, designed especially for filming and for caribou studies. So, before filming, the enclosure had to be built, an expedition to capture the caribou was undertaken during the winter of 1998-99, and 22 caribou had to be transported more than 1,000 kilometres (621 miles) to the zoo. The births were filmed in June 1999. A veterinarian, working with several assistants, supervised the whole project. Once calving time came, the caribou were under 24-hour supervision — to make sure that none of the births was missed. The film crew got to watch 16 caribou births, and filmed several of them.

What was in it for the researchers? They got to conduct a study on the increase in body-weight of migratory caribou during the first years of their lives in ideal growth conditions. The study continues, long after filming ended, and the results will be compared with data for caribou living in their natural, northern environment. The information will allow us to evaluate the physical condition of caribou in the wild to better understand the state of their health. There are some concerns that numbers in the George River herd are about to drop significantly. This study will help us understand if that’s the case.

The filming process also allowed researchers to spend time observing Arctic fauna and place some new transmitter collars on caribou. There is a spectacular scene in the film in which Inuit host Adamie Inukpuk and wildlife biologist Serge Couturier capture a caribou and outfit it with a transmitter. Observant viewers will note that the number on the collar is 2408. Each collar has a unique identification number, so that the animal can be followed over the thousands of kilometres (or miles) it will travel during its annual migration. So the scene is more than just a pretty piece of filmmaking!

Great North

in Numbers

Camera: IMAX® 15/70
(15 perforations per 70mm frame)

Weight of camera, loaded:
45 kilograms (99 pounds)

Location shoots: 6 October 1998
(Schefferville, Canada); April 1999
(Kangiqsujuaq and Puvirnituq,
Canada); June 1999 (Saint-Félicien
and Kuujjuaq, Canada); September
1999 (Jokkmokk, Sweden)

Size of film set: Approximately
1 000 000 square kilometres
(386,102 square miles)

Size of film crew: 8 to 20,
depending on the location

Amount of time spent in the far
North (Canada and Sweden):
4 months

Number of planes chartered: 27

Types of planes chartered:
Single Otter³, Twin Otter³, Navajo,
Boeing 748, Cessna Caravan

Models of helicopters chartered
from Aérospatiale: B2, D, BA and
Dauphin

Hours spent in helicopters: 300

Number of snowmobiles rented: 12

Number of Inuit sleds (“qamutik”) used to transport equipment: 20

Length of exposed film:
72 kilometres (45 miles)

Rolls of film transported: 217
(with a total weight of 1,000 kilograms, or 2,205 pounds)

Length of one roll of film:
333 metres (1,093 feet)

Number of minutes you can shoot with one roll: 3

Minutes of film exposed: 651

Final length of Great North: 40 min.

Number of caribou filmed: We invite you to count them while watching Great North!
FILMING IN THE NORTH

What effects does the environment have on filming in the North?

There’s no short answer to this question. First of all, the crew has to deal with a large, mostly uninhabited area. Access to goods and services most film crews take for granted (such as fuel, electricity and personnel) is limited. So before setting off, the crew has to make sure it has enough of everything — including enough people.

The weather, unpredictable at best, dictates how the filmmaker will prepare for a scene. Adamie, Great North’s Inuit host, says that waiting “is not a waste of time.” That’s a rule that applies equally well to seal hunters and image hunters. Filming outdoors requires a great deal of patience. Great North was filmed in an area covering several hundred square kilometres (or miles). But weather conditions can kill the best-laid filming plans, so it was important to always have several backup plans. All this meant that long waits were inevitable.

Temperature has a significant effect, too. One of the most striking examples of this was the scene in Great North featuring mussel gathering under the ice. The crew shot the scene under the ice, where the temperature fluctuated around 0°C Celsius (32°Fahrenheit). Meanwhile, above the 2-metre (6.6-foot) ice, the temperature was down around -20°C to -30°C Celsius (-4°F to -22°Fahrenheit).

What methods of transportation do you use when filming in the far North?

The airplane remains the ideal mode of transport for establishing a base camp, because it allows lots of equipment and food to be moved in, in the shortest possible time. Once the base camp is set up, the helicopter becomes the aircraft method of choice. It can carry the crew to various shooting locations — sometimes over 100 kilometres (62 miles) from the base camp. Because helicopters can land almost anywhere, they give the crew access to spectacular shots at a moment’s notice. The aerial scenes were filmed with the camera on a specially designed mount attached to the helicopter. With this rig, it was possible to capture arresting images of the northern landscape and its inhabitants.
Does light play an important role for filmmakers in the North?

Definitely. Of course, light is always an essential element in the filmmaking process. Capturing the landscapes in Great North required good lighting. But there are other elements at play when filming in the Arctic — like the tremendous seasonal variation in the number of hours of daylight. For instance, during location-scouting in Sweden in February, the sun was in the sky for only two hours a day. On the other hand, summer film shoots allowed for much longer hours.

Filming in the winter presented several challenges, one of the most important of which was calculating flight time; the crew had to be back at base camp before nightfall. Fortunately for filmmakers in the North, there is a long magic hour in the region. This phenomenon occurs all over the world, but is more marked in the North. What is the magic hour? Sunlight hits the subject being filmed at different angles over the course of the day. When the sun is directly above the subject, the light is at its strongest. This is called “cold” light, and it is filtered less by the atmosphere than light coming in at an angle. When light strikes the subject at an angle and has to pass through a thicker layer of atmosphere, it is called “hot.” The hottest light comes just after sunrise and just before sunset — this is the magic hour. At high latitudes, as in the Arctic, the sun is never directly over the subject; it remains quite low on the horizon. As a result, the magic hour lasts longer than it does farther south, allowing cinematographers more opportunities to shoot stunning images.

How do you orient yourself on this enormous film set?

Maps and compasses have long been essential tools for navigation in the North. Today people also use radio links between aircraft and the ground, earth-based guidance systems for larger aircraft and even systems that let you quickly locate an aircraft in the event of an emergency landing or an accident. For the last few years, airplanes and helicopters have also had access to highly sophisticated navigation methods such as GPS (Global Positioning System), which uses satellites to pinpoint location.

No matter what equipment is involved, though, the weather has the last word when it comes to travelling in the North. If it doesn’t cooperate, you don’t go anywhere.
Chapter 6

Why a giant-screen film?
The tundra is an ecosystem of spectacular landscapes. The best way to show the grandeur of these vistas is on a giant screen. A television screen captures only a tiny portion of the landscape. TV is best-suited to medium and close-up shots. Great North’s filmmakers opted for a medium that would capture a larger sense of the vastness of the North.

While conventional feature films use 35mm film², Great North was shot in 65mm. In order to be projected in giant-screen theatres, the image was then transferred to 70mm film. The giant screen is about eight storeys high, approximately 10 times larger than a conventional screen. What better way to see the great North?

Shooting Stories

Sound recordist Leon Johnson was under close observation by a black bear for two hours during a shoot in Labrador, northern Canada. Shortly afterwards, he and his recording equipment were in the middle of a sea of caribou — about 10,000 of them.

The film crew’s helicopter was requisitioned twice for emergency duty. It was used to answer distress calls near the northern Quebec community of Kuujjuaq.

Chimo, a young muskox at the Saint-Félicien Zoo, was quickly nicknamed “Crazy Kuujjuaq” thanks to his habit of entertaining himself by following the film crew’s red truck and then charging wildly into it. Needless to say, they quickly traded it in for a green truck.

On the way to film the largest glacier in Norway, the production team had to land on the Swedish side of the glacier because they did not have a permit to land in Norway. As a result, they had to lug 140 kilograms (309 pounds) of film equipment for one kilometre (0.6 miles) on their backs!
Become a Northern Filmmaker

Goal:
Learning about factors that affect making a film in the North

Materials:
2 standard dice
Paper and pencils
Reference books on the North (optional)

Directions:
1. Divide the group into seven teams
2. Give each team a copy of this text, which sets the scene:

“
You are part of a major film crew. Your team flew into Kuujjuaq, in Quebec’s far North, yesterday. It’s late March. The temperature this morning is -10°C (14°F). The sky is magnificent — a filmmaker’s dream! Your mission is to prepare a list of the equipment you will need to shoot three Arctic scenes for the film *Great North*. The scenes show the capture of caribou by biologists. You have to do your planning, keeping in mind the weight of the gear and your budget.”

Here are the scenes you are going to film (taken from the original screenplay by David Homel):

**Scene 17**
The capturing sequence as seen from the helicopter. The helicopter catches up to the stream of animals, the shooter chooses a caribou, shoots the net-gun and a caribou is brought down.

**Scene 18**
Helicopter lands and two men emerge, running: the scientist and the Inuit. They are dressed in different ways to show who represents the South, and who the North. They remove the net and sit on the caribou to apply the satellite collar. Both scientist and Inuit take an active part in the job.

**Scene 19**
The procedure is finished. The caribou gets to her feet and immediately runs to join the herd. We can see that the animal is unharmed.
### Director of Photography (Item, weight in kilograms/pounds, price in dollars)

- Camera battery (50 kg/110 lb., $200 per day)
- Camera (30 kg/66 pounds, $1,000 per day)
- Video camera to film the film shoot (10 kg/22 lb., $600)
- Aeronautical charts for northern Quebec (0.5 kg/1 lb., $25)
- Topographical maps of Sweden (0.5 kg/1 lb., $50)
- Director’s chair (4 kg/9 lb., $25)
- Battery recharger (30 kg/66 lb., $50 per day)
- Office supplies — paper, pencils, etc. (5 kg/11 lb., $50)
- Sound equipment (100 kg/220 lb., $200 per day)
- Camera gear (550 kg/1,212 lb., $500 per day)
- Stepladder (10 kg/22 lb., $50)
- Special mount for aerial filming (50 kg/110 lb., $200 per day)
- Camera lenses (37 kg/82 lb., $500 rental)
- Book: The ABC’s of Giant-Screen Film (1 kg/2 lb., $22)
- Laptop computer (20 kg/44 lb., $4,000)
- Rails for filming travelling shots (100 kg/220 lb., $200 per day)
- Film stock for shooting in low light (45 kg/99 lb., $1,000)
- Film stock for shooting in bright light (45 kg/99 lb., $1,000)
- Sand in fabric bags, to stabilize the camera (60 kg/132 lb. including sand, $100)
- Fax machine (5 kg/11 lb., $300)
- Colour television (20 kg/44 lb., $500)
- Camera tripod (10 kg/22 lb., $50 per day)

### Equipment for base camp (Item, weight in kilograms/pounds, price in dollars)

- Fuel (20 barrels, one barrel per hour of helicopter use) (4,000 kg/8,818 lb., $8,600)
- Camping equipment (200 kg/440 lb., $3,000)
- Electronic games (10 kg/22 lb., $400)
- Food for 8 people for 7 days (150 kg/330 lb., $2,400)
- Satellite telephone (1 kg/2 lb., $2,000)
- Chemical toilet (40 kg/88 lb., $20 per day)
- First aid kit (20 kg/44 lb., $50)
- Expedition clothing, per person (20 kg/44 lb., $1,500)

### Transport*

<table>
<thead>
<tr>
<th>Transport</th>
<th>Maximum Load</th>
<th>Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>de Havilland Twin Otter</td>
<td>1257 kg</td>
<td>$16/km</td>
<td>Plane equipped with skis. Can land on the tundra</td>
</tr>
<tr>
<td>Cessna 206</td>
<td>340 kg</td>
<td>$1.50/km</td>
<td>Plane on floats</td>
</tr>
<tr>
<td>Astar BA Helicopter</td>
<td>450 kg</td>
<td>$900/hour</td>
<td>Can land just about anywhere. Travels at an average of 120 km (75 miles) per hour.</td>
</tr>
<tr>
<td>Snowmobile</td>
<td>600 kg</td>
<td>$200/day</td>
<td>Travels at an average of 25 km (15.5 miles) per hour</td>
</tr>
</tbody>
</table>

*Note: Snowmobile and all aircraft are based in Kuujjuaq and must return there by nightfall. Only the helicopter can stay with the crew the whole time. 0.4536 kg = 1 lb.
Filming
The film shoot is expected to last seven days.

Weather
At this time of year, daytime highs average -13°C Celsius (9°F Fahrenheit) and nighttime lows average -24°C Celsius (-11°F Fahrenheit). Precipitation is primarily snow, and there is an average of 8 hours of daylight.

The Caribou
Thanks to telemetry, the crew’s consulting biologist has determined that the caribou are 100 kilometres (62 miles) south-east of the village. The base camp will have to be set up in the middle of the tundra, near the caribou.

The Film Crew
The film crew consists of eight people: a director, a director of photography, a camera assistant, an equipment manager, a helicopter pilot, a consulting scientist, an Inuit assistant who will help with the caribou capture and a base camp-manager/cook. Each person weighs an average of 90 kg (198 pounds), with personal baggage weighing 40 kg (88 pounds).

5. Each team has a budget of $100,000 to buy and rent equipment and charter transportation needed for the film shoot. Each team must include in its budget 15 hours of helicopter time (not counting unforeseen circumstances) and a cost of $20,000 for transporting people and equipment from their departure point to Kuujjuaq.

6. Ask each team to prepare a list of the equipment they will take with them from Kuujjuaq to the base camp. Then ask each team to specify what form of transportation they will use. They will have to make sure not to overload the aircraft or go over budget.

7. As a supplementary exercise, ask each team to list, on a separate sheet of paper which material comes under the categories of camping, first aid kit and food.

Note to teachers/group leaders:
if you are working with a younger group, instruction number 7 can replace numbers 5 and 6.
Let’s Explore Some More:

8. Read the following scenario to the entire group: Your base camp is set up and you have seven days to film your sequence. According to your calculations, three full days of work should be enough — but when you are filming in the far North, expect the unexpected! Will you be able to shoot three full days without going over budget, and with the equipment at your disposal? We’ll see!

9. The first team rolls two dice and looks at the chart on page 13. Each team looks at the instructions and responds accordingly, by adjusting their budget or their equipment. Go around the table to discuss the solutions (equipment used, cost of operations, etc.) that each team chose.

10. Repeat the previous step six times with a different team rolling the dice each time. After seven days (and seven rolls of the dice), determine whether three days of shooting could be completed, and if each team stayed within its budget.

Questions:

Why do we study the caribou? Why do we use telemetry to study certain aspects of the life of the caribou? Do you know of any other studies on wild animals? What techniques do they use?

How did telemetry help with the making of the film Great North? What does the film do for the caribou? Do you know of any other examples of cooperation between scientists and filmmakers? What precautions must be taken to avoid harming the animals?

What are the main problems associated with filming in the North? What innovative solutions do people come up with to deal with them? What difficulties have you had to face in filming something or taking photos? What solutions did you find?

What makes navigation in the North more complicated than elsewhere? What tools allow us to orient ourselves, despite the challenges? Which of these tools do you use, or have around you, in your daily life? Do you know of any other, less technologically advanced methods?

Resources

WEB SITES
Great North The Movie: www.great-north.com
IMAX® Corporation: www.imax.com
Wildlife telemetry using the Argos system: www.argosinc.com
### Results of Dice Throws (2 six-sided dice)

<table>
<thead>
<tr>
<th>Result</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Respond to a distress call 200 kilometres (124 miles) south-east of the base camp. Two injured people have to be transported from the site of their accident to Kuujjuaq. Health services will reimburse you for your costs — later — of course. But in the meantime, you can’t film today.</td>
</tr>
<tr>
<td>3</td>
<td>The helicopter pilot is seriously ill. Early in the morning, you decide to get him to a doctor to be examined. No shooting today.</td>
</tr>
<tr>
<td>4</td>
<td>The main camera is out of order. A replacement part ordered from a supplier in Montreal (Canada) arrived at noon, and you have to go pick it up at Kuujjuaq airport. The cost of the part, transportation from Montreal included, is $250. Another day of filming lost.</td>
</tr>
<tr>
<td>5</td>
<td>Due to unforeseen events, your fuel reserves are low. You must buy 12 more barrels in the village. At the same time, you have an opportunity to film muskoxen 75 kilometres (47 miles) from the base camp. This wasn’t part of your shooting plan, but it’s too good an opportunity to miss!</td>
</tr>
<tr>
<td>6</td>
<td>Cloud cover results in reduced lighting conditions. You will have to use more sensitive film stock, but you can shoot today.</td>
</tr>
<tr>
<td>7</td>
<td>No problems on the horizon. You will be able to film a scene today!</td>
</tr>
<tr>
<td>8</td>
<td>A beautiful day — ideal for filming the aerial scene from the helicopter.</td>
</tr>
<tr>
<td>9</td>
<td>A snowstorm has blanketed the region. The snowfall means the helicopter won’t be able to take off today.</td>
</tr>
<tr>
<td>10</td>
<td>It hasn’t been possible to receive telemetry data to locate the caribou today. Instead, you spend the day on reconnaissance flights.</td>
</tr>
<tr>
<td>11</td>
<td>The caribou herd is out of range of the base camp. You have to move the camp 50 kilometres (31 miles) farther south-east. The whole day will be spent on the move.</td>
</tr>
<tr>
<td>12</td>
<td>An aircraft is stuck on the tundra, out of fuel, about 300 kilometres (186 miles) from the base camp. You’ve been asked to deliver a barrel of fuel from your reserve. You will be reimbursed for the cost of the fuel, but you won’t be able to film today.</td>
</tr>
</tbody>
</table>

### Note to group leaders:
The teams may offer all kinds of original solutions and imagine a variety of possible situations. These may be outside the original scope of the activity. No problem! There is no one right answer. Encourage discussion by asking questions about their choices; make sure they haven’t forgotten anything, and that they stick to using the material they have available and stay within their budget.