The Wonderful World of the
Boreal Woodland Caribou
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THE WONDERFUL WORLD OF THE BOREAL WOODLAND CARIBOU  
CORRELATION TO PROVINCIAL OUTCOMES  
SENIOR 2 SCIENCE  
BIOLOGY 40S

SENIOR 2 SCIENCE

S2 – 1 – 04: Describe the carrying capacity of an ecosystem  
General learning outcomes: D2, E2, E3

S2 – 1 – 05: Investigate and discuss various limiting factors that influence population dynamics  
General learning outcomes: C2, D2, E2, E3

S2 – 1 – 06: Construct and interpret graphs of population dynamics  
General learning outcomes: C2, C6, C8, D2

S2 – 1 – 08: Observe and document a range of organisms that illustrate the biodiversity of a regional ecosystem  
General learning outcomes: D2, E2, E3

S2 – 1 – 09: Explain how the biodiversity of an ecosystem contributes to its sustainability  
General learning outcomes: B5, E1

S2 – 1 – 10: Investigate how human activities affect an ecosystem and propose a course of action to enhance its sustainability  
General learning outcomes: B5, C4, C5, C8

SENIOR 4 BIOLOGY

GENERAL LEARNING OUTCOMES:

PERSONAL PERSPECTIVES/ REFLECTION:

S4B – 0 – P3: Recognize the importance of maintaining biodiversity and the role that individuals can play in this endeavor

S4B – 0 – P4: Recognize that humans have impacted and continue to impact the environment

SCIENTIFIC INQUIRY AND PROBLEM SOLVING:

S4B – 0 – S1: Use appropriate scientific problem solving or inquiry strategies when answering a question or solving a problem
DECISION MAKING:

S4B – 0 – D1: Identify and explore a current issue

S4B – 0 – D5: Propose a course of action related to an issue

INFORMATION MANAGEMENT AND COMMUNICATION:

S4B – 0 – 11: Synthesize information obtained from a variety of sources

SPECIFIC LEARNING OUTCOMES:

UNIT 3: EVOLUTIONARY THEORY AND BIODIVERSITY

S4B – 3 – 01: Describe how populations can become genetically isolated

UNIT 4: ORGANIZING BIODIVERSITY

S4B – 4 – 01: Define the concept of biodiversity in terms of ecosystem, species, and genetic biodiversity

UNIT 5: CONSERVATION ON BIODIVERSITY

S4B – 5 – 01: Discuss a variety of reasons for maintaining biodiversity: Include: maintaining a diverse gene pool, economic values, sustainability of an ecosystem

S4B – 5 – 02: Describe strategies used to conserve biodiversity. Examples: habitat preservation, wildlife corridors, species preservation, public education

S4B – 5 – 03: Select and use appropriate tools or procedures to determine and monitor biodiversity in an area

S4B – 5 – 04: Investigate an issue related to the conservation of biodiversity
SECTION 1 - GETTING TO KNOW THE BOREAL WOODLAND CARIBOU

PART 1: INTRODUCING MANITOBA’S CARIBOU

Woodland Caribou (*Rangifer tarandus caribou*) at one time occurred in all of Manitoba’s Boreal Forests, as far south as the American border and into Minnesota. By the mid 1900’s they had been displaced from south eastern Manitoba due to changes associated with human development such as land clearing and road building. Boreal Woodland Caribou require large areas of undisturbed, mature coniferous forest, and are very sensitive to the ecological changes that occur when humans access, develop and use forests. These ecological changes, and their effects on Boreal Woodland Caribou are discussed in subsequent sections.

Boreal Woodland Caribou have been part of the Manitoba landscape for thousands of years. They differ in both behavior and physical appearance from the closely related Barren-Ground Caribou (*Rangifer tarandus groenlandicus*) which also occur in Manitoba. Barren-Ground Caribou live on the tundra of northern Manitoba, while Woodland Caribou live further south in Manitoba’s Boreal Forest zone. Barren-Ground Caribou occur in herds of thousands of animals while Woodland Caribou usually occur in groups of less than 150 animals. Barren-Ground Caribou are well known for undertaking annual seasonal migrations that may cover hundreds of kilometers. Woodland Caribou are far less migratory than the Barren-Ground Caribou. The seasonal migrations of Woodland Caribou rarely exceed 80 km, and some Woodland Caribou may remain in the same general area year-round.

Woodland Caribou use different HABITATS at different times of the year. To do this, they migrate to different parts of the forest, where each of these habitats are located. The portion of the forest that includes all the areas that are used by a group of caribou throughout the year is called the RANGE of that group of caribou. The word range is used (rather than herd) to describe a group of Woodland Caribou. In Manitoba, ten distinct Boreal Woodland Caribou ranges have been identified. Two of these, the Owl Lake and the Atikaki-Berens range, occur in eastern Manitoba.
PART 2: A YEAR IN THE LIFE OF A WOODLAND CARIBOU...

Woodland Caribou choose habitats that provide the foods they need, as well as refuge from predators. Their use of habitat and space within their range is driven by their need to distance themselves as much as possible from predators. One way of avoiding predators is to occur in low numbers, and to reduce your density by spreading the members of your group across a wide area. Another way is to live in habitats where predator densities are relatively low. Woodland Caribou use both of these strategies.

WINTER HABITAT includes rocky outcrops of mature Jack Pine and Black Spruce trees, interspersed with Black Spruce Swamps and sparsely treed wetlands. These areas do not have many edible plants to offer, but they do provide abundant supplies of LICHENS, the main source of winter food for caribou. Groups of Woodland Caribou usually migrate to the same WINTERING areas within their range each year, unless these areas are altered by fire, wind damage or other (human-caused) means. Caribou are the only hoofed animal, including Moose (*Alces alces*) and White-tailed Deer (*Odocoileus virginianus*) able to thrive on a winter diet of lichens. This means that the wintering areas used by Woodland Caribou have lower numbers of Moose and White-tailed Deer in surrounding areas. If there are fewer Moose and White-tailed Deer in an area, the densities of predators such as Timber Wolves (*Lupus lupus*) in that area will also be lower. This is important to understand, as caribou behavior is closely related to their need to avoid predators. By living in mature, lichen-rich forests, caribou are able to space themselves from an ALTERNATE PREY SPECIES such as Moose and White-tailed Deer. This helps caribou to reduce their chances of encountering, and being killed by wolves.

In the spring, the wintering groups of Woodland Caribou break up and spread out and migrate to their SUMMERING AREAS. SUMMER HABITAT is more diverse than winter habitat. Summering areas typically include lakes and wetland complexes with islands of high ground. These areas may also include mixed stands of coniferous and deciduous trees as well as pure deciduous stands. With the greater variety of forest stands there is also a greater variety of foods available. This is important, because the summer is a time when fat reserves are built up for the coming winter. A greater variety of foods may be associated with greater numbers of other ungulates, as well as a greater number and variety of predators. Woodland Caribou cope with this threat by spreading their numbers widely over their summer range. This reduces their density on the landscape and helps to reduce detection by predators.

Caribou will cross frozen lakes to avoid predators.
The cows (females) often seek out CALVING SITES on the islands of lakes, or on islands of high ground in wetlands. These areas provide opportunities for escape if danger threatens. Caribou are excellent swimmers, and will quickly jump into the water and swim to escape from predators. A female may return to the same calving site year after year. The calves are born mid May to early July. Once the calves have grown stronger, the cow-calf pairs will venture further, but they usually remain near water or in wetlands throughout the summer.

Boreal Woodland Caribou usually begin migrating out of their summering areas in September. The mating season, or RUT, occurs in October. At this time, small groups of caribou gather together in RUTTING AREAS. Cows emit a PHEROMONE (chemical scent) that is irresistible to the bulls. This scent lets all bulls in an area know that a cow is in ESTROUS (heat), and ready to mate. A rutting bull, in turn, emits a grunting, belching sound to attract the attention of the cow. The habitat requirements of RUTTING AREAS are not well understood, but we know that in eastern Manitoba mating often occurs in open or partly open wetlands.

By mid to late November, most Woodland Caribou have migrated back into their wintering areas. They will remain in these wintering areas until the following spring, when the annual cycle of movement begins again. When caribou migrate from one seasonal habitat area to another, they often follow the same TRAVEL CORRIDORS year after year. In some places deep narrow trails have formed after being pounded by hooves for years.

The one thing that sets caribou apart from other animals is their need for space. For caribou to persist on the landscape, they need lots of space. Firstly, large areas of mature coniferous forest are needed to allow caribou to space themselves from predators. Their range must be large enough to provide all the habitats required throughout the year. And finally, the landscape must be large enough to provide alternate areas of habitat for caribou to move to in the event of a major FOREST DISTURBANCE, such as wildfire, which may be a frequent occurrence in the mature boreal forest.
PART 3: MENU OF A LICHEN EATER...

During winter, Woodland Caribou subsist almost entirely on lichens. The Woodland Caribou are unique in that they have the ability to digest lichens. In eastern Manitoba, TERRESTRIAL (ground) lichens provide the main source of food. The hooves are well-adapted for CRATERING (digging out) terrestrial lichens under the snow. Terrestrial lichens flourish on the thin, poor soils of the rocky Jack Pine outcrops, where competition from other plants is low, and where breaks in the forest canopy allow light to penetrate to the forest floor. As these higher, rocky areas tend to be exposed to winds, the snow depths are lower here than in surrounding areas. Lower snow depths make it easier for caribou to reach the clumps of lichen under the snow.

ARBOREAL (tree) lichens are another food source which Woodland Caribou strip from the lower branches of various coniferous trees. In eastern Manitoba, arboreal lichens which occur on some trees, are a primary food source of food. Thicker patches of arboreal lichens can be found in Black Spruce swamps and flat, open wetlands. However, the snow depths are much greater in these low lying areas, making feeding more difficult.

In summer, lichens will still be eaten, but there is a greater variety of foods available. The leaves of deciduous species such as willow, aspen and birch are browsed. Fungi, grasses, sedges (grass-like plants) and small herbaceous plants such as forbs are also eaten. The quality browse of summer will be stored as fat to help get them through a long, cold winter.
PART 4: A DAY IN THE LIFE OF A WOODLAND CARIBOU

A caribou's day is spent feeding, bedding and being alert for predators. During a summer day, there may be 3 or more periods of feeding alternated with periods of rest. Feeding can continue for long durations, as a caribou will eat about 3 kg of lichen per day. During the winter, feeding occurs mainly in the early morning and early evening, and caribou are inactive for the rest of the day. This is done to conserve energy, as moving through deep snow uses up a lot of energy. More resting means less energy is required.

During the summer, Woodland Caribou are dispersed widely across the landscape. While this is not a time when caribou seek out other members of their group, some of the bulls and/or immature caribou may associate for periods of time in groups of 2 – 5 animals. When together, caribou will communicate with snorts or grunts. When caribou congregate together during the winter months, a group may sometimes be led by a mature cow. Most groups, however, have a rather loose social organization, with no definite leader. If one caribou begins to move along, others will follow, until the whole group is moving.

PART 5: HOW DO WOODLAND CARIBOU MAINTAIN THEIR NUMBERS?

Most female Woodland caribou give birth to their first calf in their third year of life. A single calf is born after a 7-8 month GESTATION PERIOD, or time between conception and birth. Calves are usually born from mid-May to early July, and weigh about 5 kg at birth. Calves can stand in a few hours, run in a few days and swim shortly thereafter.

The calves are particularly vulnerable to predation in their first few months of life. The main predator on caribou is the Timber Wolf, but young calves may also be taken by bears, lynx and wolverines. Caribou are excellent swimmers, and a cow will quickly lead her calf into water to evade predators, swimming across lakes at up to 10 km per hour. Even so, depending on the location and the density of predators, anywhere from 50 – 90 % or more of the calves born in a population may be killed by predators.
The odds of survival increase greatly after a calf reaches about 6 months of age. For a population to be sustainable, at least 10 - 15% of the calves born each year must survive to be RECRUITED into the population (these individuals will develop into reproducing adults). Since a cow produces only one calf per year, and many calves do not survive, it is important that most of the mature (reproductive) females survive to reproduce again the following spring. The risk of death by predation for adult caribou is greatest during the spring and summer months, when they are in habitats associated with higher predator densities.

Caribou MORTALITY (death) can occur by predation, various diseases, or through injuries suffered in accidents, including collisions with vehicles. In Manitoba, the main cause of parasite-related mortality is by transmission of BRAINWORM to caribou from White-Tailed Deer. Brainworm is not transmitted directly by caribou-deer contact, but through terrestrial snails, which are the intermediate host of the parasite. The larvae of the parasite pass through the deer’s digestive system and are shed in pellets (faeces). The larvae burrow into terrestrial snails, which are inadvertently eaten by Woodland Caribou as they graze vegetation on the forest floor. The Brainworm parasite is harmless to White-Tailed Deer, but fatal to caribou. Therefore, White-Tailed Deer in caribou range pose a threat to woodland caribou. The presence of white-tailed deer is also associated with Timber Wolves, and a greater risk of predation for Woodland Caribou.

PART 6: ADAPTATIONS OF A BOREAL FOREST SPECIALIST

Woodland Caribou live in the Boreal Forest. This is a generally harsh environment, with long, cold winters, deep snow, and short, cool summers. Animals living year round in this environment generally have effective ways of dealing with harsh conditions. The Woodland Caribou has many adaptations to meet these challenges, some of which have already been mentioned in preceding sections. The following diagram summarizes the physical and METABOLIC (internal physiological) adaptations that help Woodland Caribou survive:

Did you know? Lichen is a unique organism. It is a combination of algae and fungi living together. Both parts have their own jobs. The fungi provide shelter and water. The algae provide food through photosynthesis.
1. **Thick, insulating winter coat:**
   During the fall, the caribou grows a dense, double-layered coat. The thick undercoat and outer layer of hollow guard hairs are efficient at preventing heat loss.

2. **Short furry ears prevent heat loss:**
   The ears are small and thickly furred. These adaptations decrease surface area exposed to the cold, and provide insulation to retain heat.

3. **Densely furred muzzle prevents heat loss:**
   Long muzzle warms incoming air, cools outgoing air. The long muzzle accommodates a complex series of thin bones that increase the surface area inside the muzzle. The cold air breathed in by the caribou is warmed before it reaches the lungs. The air breathed out by the caribou cools as it passes through these bones, which retain the heat inside the muzzle.

4. **Wide hooves scoop out lichens and provide support on snow:**
   The wide hooves act like shovels to dig for lichens, which caribou can smell under snow as much as 100 cm deep. The edges of the hooves grow longer in winter, with sharper edges for better traction on ice and snow. Long bristle-like hairs cover the hooves and provide insulation from cold.

5. **Digestive system slows down to optimize energy intake:**
   Lichens take longer to digest than the higher quality foods eaten in the summer. During the winter, the digestive process slows down to allow time for special enzymes in the caribou’s stomach to break down the winter diet of lichens.

6. **Counter current blood flow in extremities conserves heat:**
   The arteries carry warm, oxygen-rich blood from the heart to all parts of the body. Veins return the blood to the heart. The veins and arteries lie close together in the legs, muzzle and ears. This allows warm arterial blood flowing to the extremities to pre-warm the cool venous blood returning to the heart.

7. **Body fat stored here for future use**
   In times of extreme cold, this body fat will be metabolized to provide additional energy.

8. **Short furry tail reduces heat loss.**
   The tail is small and thickly furred. These adaptations decrease surface area exposed to the cold.
PART 7: WHAT MAKES THE WOODLAND CARIBOU VULNERABLE?
ECOLOGY OF A THREATENED SPECIES

The physical and metabolic adaptations that help Woodland Caribou cope with a harsh winter environment are relatively simple and easy to understand. The factors that make them a vulnerable species are more complex. To understand these factors, we have to consider the ecology, biology and behavior of the Woodland Caribou. The most important thing to remember is that much of the ecology and behavior of Woodland Caribou is related to their need to reduce their chances of meeting, or being caught and killed by predators. Any change that alters this balance can have a negative effect on a Woodland Caribou population. Since Woodland Caribou have a low reproductive potential (only one calf per female per year) and a low rate of calf survival (usually only about 10 – 15%), they are slow to recover from any population loss.

Woodland Caribou have evolved to thrive in portions of MATURE CONIFEROUS FORESTS where other ungulates cannot survive. They can do this because of their ability to eat lichens. By spacing themselves from alternate prey species, Woodland Caribou also space themselves from predators. By living in smaller groups and spreading their numbers across a wide area, they further reduce their chances of encountering a predator. This strategy requires that large areas of undisturbed suitable habitat must be available.

WILDFIRE is a NATURAL DISTURBANCE that alters the age of the forest. When a wildfire burns an area, the mature forest is replaced with a young, regenerating forest. Young forests are unsuitable for Woodland Caribou. The lichens are burned off and browse plants attractive to Moose flourish. As Moose densities increase, predator densities also increase. Fires occur frequently in the Boreal Forest, and shape its ecology. Most of the fires that occur each year are small. Occasional large wildfires occur, and these major events are responsible for the majority of the area burned in the Boreal Forest. For example, the entire winter range of the Owl Lake Woodland Caribou originated from a single wildfire that occurred in 1929. On a very large natural landscape, and over the long-term, wildfires are beneficial, as they act to renew the forest. If one area burns, Woodland Caribou will move to another (alternate) area of suitable forest age and type. A burned area will be re-occupied by Woodland Caribou once it has regenerated to an age where it once again provides lichens and refuge from predators. In eastern Manitoba, this takes 50 – 60 years. Wildfire does pose a threat to Woodland Caribou. They will continue to persist if the landscape available to them is large enough to include areas of alternate habitat to move to. Human activity can influence this relationship.

The Boreal Forest is an ecosystem dominated by coniferous trees such as pine, spruce and fir.

Human developments result in disturbances that reduce the REFUGE (survival) value of the forest to Woodland Caribou. Some developments (e.g. cottage
subdivisions, campgrounds, towns, mines) result in permanent LOSS OF HABITAT. Human activities associated with these and other developments (noise and activity associated with roads, boat traffic, drilling, logging) can cause caribou to avoid the disturbed areas. HABITAT AVOIDANCE can be especially negative if the disturbance is near critical wintering or calving sites. HABITAT ALTERATION poses a significant threat to Woodland Caribou. Developments such as logging can ALTER habitat in a way that makes the landscape unsuitable for occupancy by Woodland Caribou. When a forest stand is logged in caribou range, the mature trees are removed and the forest is returned to an early successional stage. Young forests offer more browse for ungulates, and Moose and White-tailed Deer will move into the logged areas. As alternate prey species move into logged areas, predators will follow, placing Woodland Caribou at risk. The presence of White-tailed Deer also places caribou at risk from Brainworm. Habitat alteration due to logging can result in LOSS of HABITAT. This occurs when an area is logged and the forest is never allowed to grow to an age suitable for Woodland Caribou occupancy (50 - 90 years).

Woodland Caribou live in habitats that are more difficult for predators to access. The wetland complexes that surround the rocky foraging areas of Woodland Caribou help to provide refuge from predators. Wetlands have high water tables in summer, and great snow depths in winter, both of which discourage travel by wolves. To be effective in providing refuge from predators, wetlands require adequate levels of precipitation, and few travel corridors for wolves. The roads and trails associated with human developments can impact caribou mortality by providing better access for predators. All-weather and winter roads provide easy travel routes for wolves. All terrain vehicle (ATV) trails and packed snowmobile trails also provide wolves with easy hunting routes and access across wetlands.

Woodland Caribou are vulnerable because they exist in low numbers, have a low reproductive potential and a low recruitment rate. Maintenance of a population depends on a high survival rate for the adult females. Threats to Woodland Caribou include human developments that result in habitat loss, avoidance or alteration, and their related impacts on caribou mortality through increased predation. Other threats include illegal and uncontrolled hunting and Brainworm. Climate change may pose a threat in the future, as warmer, drier weather would be expected to result in a greater frequency and severity of wildfires in caribou range. Drier weather would also be expected to reduce the water table in wetlands and make these areas more accessible to predators. The science of Forest Management and Wildlife Management allow managers to understand the unique needs of these magnificent creatures of the Boreal Forest, and to ensure that human activities interfere as little as possible with their biological requirements.
SECTION 1 ASSIGNMENT

PART ONE: DEFINE THE FOLLOWING TERMS:

a. habitat:
b. calving area:
c. rutting area:
d. pheromone:
e. estrous:
f. gestation period:
g. metabolism:
h. predation:
i. boreal forest:
j. ecosystem:
k. adaptation:

PART TWO: SHORT ANSWER

a. Why are caribou no longer found in their historic range in southern Manitoba?
b. How much lichen does a caribou eat in one day?
c. Explain three adaptations that help the caribou survive the harsh conditions of the long winter in the Boreal Forest.
d. What are some of the threats facing the Woodland Caribou?
e. What are some of the predators that feed on the caribou?

For Your Information

MESA is the Manitoba Endangered Species Act which is the provincial act that protects Woodland Caribou in Manitoba. Website: www.gov.mb.ca/wildlife

SARA is the Species At Risk Act which is the federal act that protects Woodland Caribou in Canada. Website: www.ec.gc.ca
SECTION 2 - SHADOWS OF THE FOREST DVD AND ACTIVITY GUIDE
(THE ACTIVITY IS TO BE DONE AFTER SHOWING THE DVD ENTITLED SHADOWS OF THE FOREST)

PART 1: QUESTIONS BASED ON THE DVD

1. HOW ARE WOODLAND CARIBOU DIFFERENT FROM BARREN-GROUND CARIBOU?
   Woodland Caribou are found in smaller herds, as well as in lower numbers than the Barren-ground Caribou. They prefer the Boreal Forest, rather than the tundra where Barren-ground Caribou are found.

2. HOW ARE CARIBOU DIFFERENT FROM OTHER HOOFED ANIMALS SUCH AS MOOSE AND DEER?
   Both males (bulls) and many females (cows) have antlers.

3. WHAT ADAPTATIONS DO CARIBOU HAVE FOR LIFE IN THE BOREAL FOREST?
   The hooves are adapted for digging in the snow for lichens, and their large surface area provides a better grip on snow and ice.

4. WHAT IS THE AVERAGE LIFE SPAN OF A WOODLAND CARIBOU?
   The average life span is about five years, although some have been known to live 13 years.

5. WHAT ARE SOME THREATS FACING THE CARIBOU POPULATION?
   Some threats are brainworm, predation from wolves, loss of habitat from forest fires, uncontrolled hunting, low birth rate, and increased access to vehicles.

6. WHAT IS TRADITIONAL ECOLOGICAL KNOWLEDGE, AND WHY IS IT IMPORTANT?
   Traditional ecological knowledge is information obtained from First Nations people. It is important because it can help us understand the history of the Woodland Caribou in the region, and their habitat needs.

7. BRIEFLY EXPLAIN WHAT USES THE CARIBOU MAKE OF THE FOLLOWING AREAS WITHIN THEIR RANGE:
   A. CRATERING AREAS
   B. RUTTING AREAS
   C. ESCAPE CORRIDORS
   D. CALVING AREAS
      a. cratering areas: feeding
      b. rutting areas: breeding
      c. escape corridors: fleeing from predators
      d. calving areas: giving birth and rearing the young calves

8. WHAT IS THE MAIN FOOD OF THE CARIBOU?
The main food of the caribou is lichen in the winter, and shrubs, grasses, and herbs in the summer.

**9. WHY DO THE FEMALES GIVE BIRTH ON ISLANDS?**
Islands afford protection and easy escape from predators.

**10. WHY ARE TRACKING COLLARS USED?**
To record movements of individual animals within the herd. Information obtained can then be used to make management decisions that will protect the species.

**11. WHAT EVIDENCE IS THERE THAT LIMITED LOGGING ACTIVITY CAN ACTUALLY BENEFIT THE CARIBOU?**
Limited logging can create conditions which allow more sunlight to reach the forest floor, which enhances the lichen growth, which is an important food in the winter and summer.

**IDEAS FOR FURTHER RESEARCH AND DISCUSSION**

1. Look up the meaning of the terms that COSEWIC (Committee On the Status of Endangered Wildlife In Canada) uses. Define the terms, and explain why the status of the Woodland Caribou has been changed from vulnerable to threatened.

2. What is an indicator species? What kinds of things can they indicate about the health of an ecosystem. List 5 species that can serve as indicator species, and why biologists rely on them.

3. It has been said that the science of wildlife management is essentially people management. In the context of the Woodland Caribou, discuss strategies to keep human impact on the caribou herd to a minimum.

4. Write a report on the biology of the Woodland Caribou. In your report, be sure to discuss reproduction, feeding, adaptations, diseases of concern, predation, and habitat needs.

**PROJECT IDEAS**

1. Create a diorama using a variety of materials showing the Woodland Caribou in their Boreal Forest environment.

2. Create a large poster or mural showing the life cycle of the Woodland Caribou and how it uses its habitat throughout the year.


4. Research the science used in global positioning systems (GPS).

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**Woodland Caribou Bingo Game Instructions**

Teachers should photocopy all five versions of Caribou Bingo cards appropriate to the class size. Students can use tokens or coins to cover squares. Teachers can decide whether to use diagonal or full house format to declare a winner.
## Woodland Caribou BINGO

<table>
<thead>
<tr>
<th>Conservation:</th>
<th>Threatened:</th>
<th>Extinct:</th>
<th>Sustainable Forest Management:</th>
<th>Habitat:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The maintenance of environmental quality, diversity and resources through the management of human activities.</td>
<td>A wildlife species likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.</td>
<td>A species that no longer exists.</td>
<td>Management that maintains and enhances the long-term health of forest ecosystems for the benefit of all living things.</td>
<td>The arrangement of food, water, shelter, space suitable for species survival.</td>
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<table>
<thead>
<tr>
<th>Special Concern:</th>
<th>Population:</th>
<th>Native Species:</th>
<th>Carrying Capacity:</th>
<th>Niche:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A wildlife species that may become a threatened or an endangered species.</td>
<td>A group of individuals of one species, found within a prescribed area and usually somewhat isolated from other groups of the same species.</td>
<td>An indigenous species that is normally found in Canada.</td>
<td>The amount of species that a given ecosystem is capable of supporting.</td>
<td>The place occupied by a species in its habitat, including the particular set of circumstances (chemical, physical and biological) that enable it to survive.</td>
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<table>
<thead>
<tr>
<th>COSEWIC:</th>
<th>Recovery:</th>
<th>Predator</th>
<th>Indicator Species:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Committee on the Status of Endangered Wildlife in Canada, COSEWIC is a committee that assesses species at risk.</td>
<td>Conservation actions undertaken to benefit an endangered or threatened species.</td>
<td>A carnivore that hunts live prey (i.e. wolves hunt caribou)</td>
<td>A species whose progress is monitored by people as an indication of what is happening to the environment as a whole.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Extirpated:</th>
<th>Endangered:</th>
<th>Stewardship:</th>
<th>Ecosystem:</th>
<th>Range:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A species that no longer exists in the wild in Canada, but exists elsewhere in the wild.</td>
<td>A wildlife species facing imminent extirpation or extinction.</td>
<td>Management of the heritage of our natural spaces, species and culture in such a way that it can be passed on to future Canadians intact.</td>
<td>An interdependent and dynamic system of living organisms with their physical and geographical environment.</td>
<td>The geographical limits of a species or groups; a migratory species usually has both a breeding range and a wintering range.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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**Woodland Caribou**

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**Woodland Caribou BINGO**

Woodland Caribou (Free Space)
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SECTION 3 - FIRST NATIONS PEOPLE AND THEIR RELATIONSHIP TO CARIBOU

What do caribou mean to First Nations people? It depends on where their ancestors lived, where they live today, and the type of caribou they have traditionally shared the land with.

Barren-ground Caribou and Peoples of the Tundra....

For many of the people living in Manitoba’s northern Tundra zone, the Barren-Ground Caribou was not only integral to their culture, but essential for survival. Barren-Ground Caribou occur in great herds of thousands of animals. For as long as people can remember, these large herds have followed the same general migration routes each year as they travel between their traditional summer and winter areas. The people knew these routes, and organized seasonal hunting expeditions to meet up with the herds. While many caribou would be harvested on each hunt, the herds were so large that the numbers taken had little effect on the caribou population, although modern vehicles such as ATV’s and snowmobiles have increased hunting success and made the herds more vulnerable to overhunting. Many parts of the animal were used. The caribou provided the people with food, clothing, shelter, tools and even fuel. A major shift in the migration route could mean the difference between life and death.

Woodland Caribou and Peoples of the Forest....

Within the Boreal Forest zone, the relationship between First Nations peoples and caribou is more complex. Woodland Caribou are the caribou of the forest. Unlike Barren-Ground Caribou, Woodland Caribou populations are small. Their herd sizes are simply not large enough to provide even a small community with all their needs on a continuing basis. Also, Woodland Caribou have evolved effective adaptations to avoid and escape from predators. These same adaptations made the Woodland Caribou a difficult animal for people to hunt.

Since Woodland Caribou occur in small numbers and are difficult to hunt, they could not have provided First Nations people with a dependable or inexhaustible source of food. Woodland Caribou continue to be an important part of the culture of many people, as reflected in their Clan system. In the Boreal Forest of eastern Manitoba, First Nations people still identify with a certain Clan that they are born into, such as the Moose, Bear, Wolf, Deer and Caribou Clans.

The Clan system reflects the diversity of relationships that people have had with their environment. The Boreal Forest offered a great variety of plants and animals that could be used for food, shelter and fuel. Many of these resources could be found in the Boreal Forest on a year-round basis, not just at certain times of the year. Also, hunting and gathering areas would sometimes change significantly for different generations of the same community. This happens because the Boreal Forest is a DYNAMIC (constantly changing) ecosystem. Wildfire is the main driver of that change. After a wildfire burns an area, it takes many years for the forest to re-grow. As the forest regenerates, the habitats within the forest also change over time. For example, young forests provide good habitat for moose and many other animals, but not for caribou. As the forest ages, it becomes better for caribou, but less suitable for moose, beaver, snowshoe hares and other species hunted by First Nations people. The people had to shift their hunting and gathering areas with the wildfire cycle, as the wildfire cycle determined what plants and animals would be available to the people. Because of this, no one animal dominated the culture of all the people living in the Boreal Forest. From what we understand, Woodland Caribou may have been more important to peoples living in the northern part of the Boreal Forest zone, than in southern forests.
Imagine what it would have been like for the First Nations people hunting Woodland Caribou many years ago. Why do you think that hunting Woodland Caribou would have been difficult? During the snow-free season, Woodland Caribou choose habitats that are difficult for predators to get to (high points of land surrounded by water or wetlands or near the shores of lakes). These habitats allowed Woodland Caribou to see, smell or hear approaching First Nations hunters, and provided quick escape routes when a hunter approached. Hunting during the snow-free season was difficult because the herds of Woodland Caribou were spread widely through the forest at that time of year. Hunting was not necessarily easier during the winter. Woodland Caribou grouped together during the winter, and although tracking was easier, deep snow made it difficult for hunters to move around. Also, Woodland Caribou are found in mature forests, where a hunter would have been less likely to find any other foods (Moose, Snowshoe Hare, Beaver) if a caribou hunt was unsuccessful.

While Woodland Caribou were difficult to hunt, early First Nations hunters understood the forest, the fire cycle and the habits of the caribou. The people were familiar with many of the traditional trails and migration routes used by Woodland caribou. These traditional trails provided ambush opportunities for the hunters, armed only with a spear or bow and arrow. The hunters may have also taken advantage of the Woodland Caribou’s natural curiosity by constructing caribou decoys out of hides and antlers. A decoy or other unusual-looking arrangement of objects would be placed in a strategic location. The hunters would then wait for a curious caribou or group of caribou to investigate the decoy or object. By the 1930’s firearms had become widespread among First Nations hunters. The range of firearms is significantly longer than the bow, and this dramatically changed the manner of hunting, and increased hunting success.

When a group of Woodland Caribou was found, the hunters would harvest as many as the animals as they could. Sometimes many caribou would be taken during one hunting expedition. More commonly, a hunter might have harvested 2 -3 caribou to help his family make it through the winter. In most areas of Manitoba’s eastern Boreal Forest, the Woodland Caribou were hunted on an opportunistic basis, supplementing the peoples’ staple diet of moose and fish. Other animals such as Snowshoe Hare, Beaver, Grouse and Waterfowl provided additional supplements to the peoples’ diet. This level of hunting probably had little impact on local Woodland Caribou populations.

Hunting expeditions might be carried out by canoe, dog sled or on foot. To express thanks when game was harvested, a small offering was made and a prayer was said. As the peoples’ lives depended on being careful and resourceful with every animal they harvested.

Most parts of the caribou would be used. (including the heart, liver and other internal organs). The hide was used for clothing, bedding and shelters. Bones were used for tools and even the sinew was used as thread for stitching together clothing and other materials. Sometimes, families would cache bones in the moss-covered soil, and dig them up later when food was scarce. A thin soup was made by boiling the bones, which contained marrow. At times, when a family had gone through a long period of time with little or no food, a soup would be made by adding lichens to the blood of a freshly-harvested caribou. The iron in the blood helped to alleviate anemia, which was common in lean times. Some of the meat of caribou taken during trapping and hunting expeditions would immediately be boiled or roasted over a fire to provide much-needed protein. The rest of the meat would be dried or smoked, as there was no refrigeration. Nothing was wasted.

Below is a summary of the comments recorded during interviews with the Elders of Poplar River (page 27 and 28) and Bloodvein River First Nations (page 29 and 30) during the fall of 2005.
1. Albert Bittern – age 56
   • Trapper and fisherman
   • Saw tracks about 6 years ago, 3-5 caribou in a small herd
   • Used to harvest caribou for meat, hides, tools
   • Dried caribou was processed into pemmican
   • 1950’s were difficult times, supplies had to be airlifted into the community
   • 1920’s were bad for fire

   “The forest is very important to me. I feel good when I walk in the forest, like I am part of nature. I see the biggest threats to the forest from fire and insects. I find peace in the forest, and use it as a source of medicine. If I could do one thing for the forest, it would be to respect it and the wildlife in it.”

2. Victor Bruce – age 73
   • Trapper and fisherman
   • Have seen caribou, 4 or 5 in a bunch
   • Saw increases in the herd in the late 70’s, and it seemed like there were more in the 80’s and 90’s than now
   • November, the caribou were heading south, in the spring they were heading north
   • These caribou are larger than the Barren-Ground Caribou
   • Saw large herd cross by the lake north of Poplar River
   • Caribou went to the spruce bluffs to feed on lichen
   • All parts of the caribou were used – liver, heart, bones, hide. The bones were used to make soup
   • They shot as many as they could, and dried the meat, and used the hides to make jackets
   • There are more caribou today than in the past
   • 1950’s: no beaver could be trapped
   • 1960’s: single men could harvest 1 beaver
   • 1970’s: no limit on beaver
   • Few people fishing and trapping today, no caribou are actively hunted today
   • Forming a protected area is important so that the youth have something for the future

   Today there seems to be plenty of ducks, geese, and crows, but few gulls, foxes, and coyotes.

   “The forest is very important to me...I have always felt like that. I enjoy being in the bush. I see fire as the biggest problem facing the forest today. I have obtained medicine from the forest, and firewood, and logs for my house. If I could do one thing for the forest, it would be to protect it all the time....”

3. Marcel Valiquette – age 76
   • Father came from Quebec, mother came from Poplar River
   • Moved to Poplar River from Big Black River in 1970
   • In the 50’s, there were lots of Caribou but also lots of wolves
   • The caribou dig up lichen and feed on rocky outcrops
   • Moose becoming more plentiful in the last 10 years
   • Marcel trapped since 1948 - there were lots of beaver, muskrat, mink, fisher and lynx, but few fox or coyote
   • Does not see a road on the east side as a threat because it would not be harming his traps directly

   “I feel good being in the forest – trapping, and I felt good hunting moose...The biggest risk facing the forest today is the loss of the old ways...people have lost their connection with the land. They would not know how to live and survive in the bush. I have hunted, trapped and fished since 1955.”
4. **France Valiquette** - wife of Marcel
   - Has seen caribou walking on the shore of Lake Winnipeg
   - Caribou could be decreasing due to noise of aircraft, outboard motors, etc.
   - There are quite a few wolves around...they kill dogs in town. They follow the river into town.
   - There are few rabbits and grouse this year
   - Traveled by dog team and canoe
   - Enjoyed the trapline
   - Moose meat was canned, smoked, and dried
   - Youth should learn some of the ways of life in the bush

   “I would rather walk in the bush than stay in the house. The biggest risk facing the forest today is a road, which would increase logging. My connection to the forest was lost when I went to residential school....”

5. **Norman Bruce** - age 73
   - Trapped with parents every fall since age 15
   - Trapped at McPhail Lake – stayed until spring breakup
   - Father would hunt caribou, and take 2 or 3 for the winter
   - Grandmother would make soup out of caribou blood and lichen, which would perk them up
   - Some moose were also shot for the winter
   - The meat was dried, and pounded into pemmican
   - Picked wild rice, ate sun dried whitefish
   - Boiled or roasted muskrat, beaver, and rabbits
   - Lots of wolves and foxes around
   - Small herd of caribou came close to Poplar River 2 years ago
   - I saw a lynx attack a small caribou. It jumped on its back and bit the neck area. The caribou ran into a heavy stand of pine. Many branches poked the lynx as the caribou ran, causing the lynx to let go. When it fell to the snow, it seemed to be injured.
   - After a kill, tobacco was offered and a prayer was said
   - .30-30 Winchester was used for caribou and moose
   - There were more caribou when he was younger
   - Animals would return about a year and a half after a fire on the trapline
   - Taught sons how to trap
   - Followed Franklin River for 2 days; lots of caribou trails. Made trail with snowshoes, and the caribou would follow the trail

   “I wore snowshoes, but could go a lot farther when I was younger. I still enjoy it today, especially rabbit snaring. Fire is the worst problem for the forest. Lightning. Fire burned up parts of my trapline 4 years ago. I have obtained medicine from the forest...the root of poplar helped heal when I chewed it...”
Bloodvein River Elder’s Interview

Q. What is your name?
A. Frank

Q. Where are you from?
A. Bloodvein

Q. Is it okay for me to video tape you?
A. Yes

Q. Have you ever seen a Caribou?
A. Yes, I seen a lot of them in my time.

Q. What is the largest number of Caribou you have seen at one time?
A. Probably about 30 or 40 in a herd.

Q. Can you please tell me the story where you saw them?
A. I guess it is almost every year when we work on the winter road. Usually there are about five to probably eight skidoos that go up to pack the winter road before it opens, just packing and let it freeze and every year we encounter a number of Caribou. Sometimes maybe we do not see them but we see many tracks but we do see many Caribou on that winter road on this side of Round Lake and north of Round Lake around the Berens River area.

Q. Where do Caribou live?
A. I guess you cannot really say. I cannot really say where they live because they are a migratory animal. They have a different place where they stay during the summer time and a different place where they go in the wintertime. That is why they are called a migratory animal. Like what I mean is when they are migratory like when you see geese flying in the spring going north, they’re migrating north and they come back in the fall migrating back south again, the same thing with a Caribou. They migrate south I guess in the wintertime then the go back. They do not stay in one place as if a moose would. However, the Caribou migrates a lot in herds.

Q. Why do Caribou travel in herds?
A. Caribou travel in herds, I just explained that the Caribou migrate and they have to get together, and when they are calving I guess that is about the only time they would probably rest and stay in one place. I do not really; I cannot really say whether the bulls stay with the Caribou when they rest for their calving. I think that is one of the reasons why the Caribou travel together is because they are migrating and maybe for some other reasons like protection.

Q. How do Caribou respond to human activity?
A. I guess it all depends on what you mean by human activity. It is one the things he is probably, they are very timid animal. When they see human sometimes, when we see them, when we encounter them with a skidoos, they kind of stop and stare because they probably do not really know what their hearing or what their seeing. The only time that they really move or get scared is when people on the skidoos get up off their machines and start walking around and then they will run. They do not, they stare for a while but they run after they see humans. Why, I do not know.

Q. How can you tell if there are Caribou close to Bloodvein?
A. How can I tell? Well, we do not see them very much in the summer time. However, we do encounter them and we see their tracks on the winter road. In the wintertime, they come closer to Bloodvein. They come closer than some people really know they do because not too many people are interested in the Caribou tracks and stuff like that. But when we travel, when we go moose hunting we always see Caribou tracks but we don’t really, we don’t bother with Caribou that much.
Q. How have (?) affected the Caribou?
A. I did not get the question

Q. How have the activities like forestry affected the Caribou?
A. I guess it does in some areas where there’s been clear-cutting with pulp wood cutting and stuff like that with the roads coming in, it would be a lot of disturbance to their normal migration and normal life. The only thing that probably is going to be good for them once they move from area to area where its not been disturbed by humans, they would probably move further and further from civilization and road, all weather roads move back closer to communities and where the Caribou are normally migrating to. Therefore, they will probably find different routes for migration.

Q. When do Caribou mate?
A. They mate probably sometime late or early fall. I guess sometimes really doesn’t, it all depends on the weather I guess if it gets cold early in the fall, they mate earlier and I guess they migrate during the winter time. To go further south and then they calve, they have their calves on the Southside of (?) on the north.

Q. What parts of the Caribou can be used?
A. I guess a lot of it had been used, not that I know myself but I heard so many stories of how they can use Caribou. They used Caribou hides for moccasins and muck lucks and drums and they use Caribou bones to scrap fat off animals like beaver, otter and moose hides. What I heard was that was the best bone for scraping hides, other hides so I know a lot of other things they probably were used like antlers, well the meat is probably used for consumption but otherwise I don’t know too much about Caribou. I do not eat Caribou myself but I know the stories I have heard from elders that they had use the whole animal.

Q. Why are Caribou so special?
A. I guess that are endangered, are considered special. Sometimes we don’t know what we do to animals until we find out that it’s too late that they are killed off or sometimes for no reason because somebody wants to take a pot shot at an animal and not even use it for any purpose and some animals are being shot like Caribou is probably shot because it’s there. Just not a reason, a good reason of shooting an animal, it is just a sport. Some people I guess they come and fly around in an airplane or a helicopter just to shoot a Caribou just to take a trophy like antlers, they do not bother with the meat. I guess in a way each animal has its own place, I guess each animal is special otherwise, it will not be there.

Q. When you went hunting for Caribou, what did you do with the Caribou?
A. Like I said before I do not really hunt Caribou. However, I did shoot a few Caribou for giving the meat away. I know there was a time that I would probably shoot two or three Caribou at the time and most of the meat that I got out of it, I did not use it myself but people around home used it. In addition, there are special, I think there is some reason, there are reasons why people do not like Caribou, because there is a smell to them. However, I guess it depends on what they eat, it is what it eats that makes that smell, odor. They have ah, I don’t know how to explain it but when we get a moose, the difference is the moose eats stuff that doesn’t produce odor but the way Caribou eat like the moss and stuff like that, it makes it, some elders say they couldn’t eat the insides like the kidneys, the liver, the heart, and stuff like that because of the intense odor that comes out. Even the hide and the hair, when you shoot a Caribou, you can smell the odor. I guess that is one of the reasons why people just do not really want to eat the meat. I do not know if it were, if the taste of the Caribou meat is there, I would not know because I never tasted it, I cannot say.
Q. Were you young when you went hunting for Caribou?
A. I did not know, thanks, I did not know there was even any Caribou at the time; it was not until later on when I worked. I used to work for a lodge, at the Sasaginigak Lodge for Northway Aviation and I was a guide over there and many times that when we were out guiding I encountered many Caribou, swimming across the lakes and rivers and I didn’t really hunt Caribou. I encountered a lot of them but I didn’t see any reason at the time to even bother trying to shoot a Caribou because it just was never in my style or bring up, I was never brought up to shoot a Caribou so I never did.

Q. When was the last time you saw a Caribou?
A. Last winter on the winter road going north we encountered about 25 of them in one herd and they were just crossing the winter road and we, when we encountered them but it was just that few minutes that we saw them standing on the road in the open area, in the open muskeg crossing our trail. That is probably the last time I saw a Caribou.

Q. Have you ever seen any petroglyphs of Caribou?
A. I did not get that.

Q. Have you ever seen any petroglyphs of Caribou?
A. Not that I ever, I do not remember. I do not know.

Q. What is your favorite memory of, of the Caribou, if you remember?
A. When I was at Sasaginigak I guess as a guide, we used to watch, they used to come right to our cabin, especially in the evenings and they’d come right up and we’d sit outside and watch them and during the days there was Americans that were at that lodge and the Americans were so interested in Caribou. Every time we saw Caribou, we would go as close as we can with our boats and follow them swimming across the lakes. And I guess it was kind of interesting for me too, not only, not only the Americans, but just to be so close to one of them, to a bunch of them swimming all at the same time, it was very interesting and when we did encounter them again crossing rivers or lakes we always, I never, they never even had to ask me, I always went, I always chased them and we would be so close to them they’d be swimming right along side the boat that we were using. It was very interesting to watch.
SECTION 4 - A DAY IN THE LIFE OF A CARIBOU BIOLOGIST - ESTIMATING THE CARIBOU POPULATION

BACKGROUND: The Boreal Forest of Manitoba is home to the Woodland Caribou, a threatened wildlife species. As a result, research is being conducted to determine the best way to protect caribou and their habitat. In this activity you will assume the role of a wildlife biologist. To make the best decisions regarding the management of the herd, you must have good information. However, like most wildlife biologists, you must work with budget constraints, a shortage of time, and few staff. Your budget allows for one aerial survey of only a portion of the Woodland Caribou’s range. You must decide where the flight will be, and then use your data to estimate the number of caribou for management purposes.

PROCEDURE:
A. In your notebook, create a table similar to the one shown below. You have only enough time and money to fly 4 flight paths. To pick a flight path at random, place 10 small pieces of paper labeled A to J in a hat, and draw 4 of them out. These will be the flight paths you will use. A sample of what your table will look like is shown below.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Flight Path</th>
<th>Number of Caribou</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>G</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>B</td>
<td>0</td>
</tr>
</tbody>
</table>

B. Count and record the number of caribou “observed” in each of the 4 flight paths you picked at random.

C. Find the total number of caribou per sample. Add them up and divide by 4 to get the average number of caribou counted per flight.

D. To calculate the average number of caribou in the 100 square kilometer plot, multiply the number obtained in step “C” by 10.

AS AN INDIVIDUAL:
1. The total number of caribou estimated in the 100 square kilometer study plot is ___________.
2. The actual number of caribou in the 100 square kilometer study plot is _____________.
3. How close was your estimation, expressed as a percentage? (ie. The herd estimate was 80% of the actual number, which would be excellent).
4. Can you brainstorm better ways to count populations of Boreal Woodland Caribou?
FOLLOW-UP ACTIVITIES:
These activities are meant to be done as a class after the students have completed their worksheets.

Ask your class the following questions:
4. How many of you found an accurate result (i.e. 80% of better)?
5. Why were most counts inaccurate?
6. Can you think of better ways to count populations?

Are there any other methods you can think of that would give the wildlife biologist information regarding the population of caribou? If so, how would they obtain this information?

ANSWER KEY:
1. Answers will vary
2. There are 100 caribou
3. Answers will vary
4. Answers will vary
5. Woodland Caribou are not evenly distributed over the landscape but are found in small, dispersed herds. It would be easy to miss all the caribou by flying the wrong flightpaths.
6. Wildlife biologists will sometimes use track counts, and pellet counts, in which piles of droppings are counted and then an estimate made on the number of animals using the area.
PART 1 - SURVIVAL: THE CARIBOU SMARTIE GAME

**Equipment**
- Two Smarties for each student (1 package will have enough Smarties for 15 – 20 kids)
- One paper slip per colour
- One paper slip per hazard
- Two containers (one for hazards and one for smarties)

**Health Notes**
Smarties are produced in a nut allergy safe factory, however there may be other allergies (chocolate, milk, flour) that are a concern in your class. Some Smartie alternatives are: coloured hard candies, multicoloured marshmallows, jelly beans or Skittles. You need any candy that has about 8 colours. We recommend that you do not use a package for more than one group. Each group should be able to see you open a new package and partial packages should not be saved.

**How to Play**
Introduce Woodland Caribou and talk about how they live. Students should be familiar with the following concepts prior to game start:
- basic caribou biology,
- what is migration (include mega-migrators vs. mini-migrators, why creatures migrate, preparation for migration),
- and the types of areas caribou use (frozen lakes for loafing, bogs for food, islands for calving, old growth forests for lichen).

Hand out two candies to each student, make sure to emphasize that they do not want to eat their Smarties! Explain that the Smarties represent a pair of caribou (one male and one female) which you need to survive in order to ensure the continuation of the species. The entire class represents one group or herd of caribou. Caribou migrate throughout the year to different areas that they use during different seasons (calving areas, summering areas, wintering areas, rutting areas). They only mate once per year and have only one young at a time (usually). Caribou move many times and therefore are almost always having just faced the hazards of migration or are about to face them again. Woodland Caribou use short migrations within their range unlike Barren-ground Caribou who travel vast distances. Caribou are very loyal to certain areas, and frequent the same travel corridors year after year and generation after generation. The scenarios that we are about to encounter are things that really happen to migrating caribou.

**Set the Stage:**

*You are all Woodland Caribou. Your home is the beautiful but harsh environment of the Boreal Forest in eastern Manitoba. The forest around you is old. The rocks are covered in delicious lichen. The lakes are clean and clear. The trees provide shelter from the snow and heat. You are well adapted to your environment. Some would say even a little set in your ways. As you travel from place to place there is competition in your forest home from other animals and by people. Migration is not an easy task and unfortunately not all of you will survive your travels. The extra effort of moving from place to place takes extra energy.*

Get one of the kids to draw a paper out of the hazard bag. Read the hazard and discuss it. Then draw a colour, all the caribou of that colour do not survive and those Smarties should be eaten. Some of the hazards are worded like a game with the kids to guess the answer. Do enough rounds so that about half of the Smarties are gone (or about 4 colours).
Conclusion:
Use a show of hands to find out: who has both smarties left? Who has one? Who has none? Explain that singles will eventually pair up but can’t have young until they do. Caribou are facing more challenges all the time because of people.

Ask the students how many caribou started in their herd (2 x # of students = starting herd size). How many died? How many potentially are replaced with young (one per pair) this year? At this rate how long until the herd is extinct.

Look at the slips. Point out that we can’t do much about predators or the weather but we can prevent loss of habitat. Get the students to give you ideas about what they can do in their own lives to help save habitat. (We often put great emphasis on saving and protecting areas that are frequented by creatures and overlook that it is just important to save the travel routes that get them there).

Hazard Cards. Copy then cut out.

You arrive tired from your journey and are looking forward to finding the perfect spot just like the year before. Last year the rocks were covered in soft lichen that took decades to grow. As you arrive you notice a difference in the ground. Where soft lichens, mushrooms and grasses had been before the ground is now black and hard beneath your hooves. The noise and confusion of the area combined with the lack of food force your herd to move on even though you are exhausted. (Ask the students what they think happened. Answer: (development).

Fall came early this year to the forest and the wind at your back has swung from the west. The snow has started to fall. The cold weather is fine as your heavy coat can protect you but the snow keeps falling and falling and falling. Even the sheltered areas under the trees have begun to fill in. Today you are able to shovel through some snow with your sharp hooves to get enough food but what about tomorrow? When will the snow stop? (Talk about heavy snowfalls and its impact on cratering. Ask the students if a possible changing climate can be a problem).

Humans moved though your area awhile back and strung some long line above the ground. You as a wily caribou have quickly adapted to this new feature on the landscape. After all there are tender new shoots next to the tree-like structure holding the lines. But, the people brought more than you thought. Wolves also frequent these open lines. More wolves move farther into your traditional territory each day. They are quick, well adapted to hunting in open areas, and have developed a taste for caribou lunch. (Ask students what types of structures these are (power lines) and if there are other developments that would increase the movement of wolves (roadways, snowmobile trails, hiking trails).

Islands provide shelter for caribou to calve. It is harder for predators to access these remote places. Many of these islands are not fancy but they are easily defendable. You quickly swim across the lake, first to one island and then to another. Just as you begin to settle in at one island, the noise of a boat causes you to move one. These boats have recently come to fish for some first class Walleye. You finally find an alright spot but you are so distracted by another passing boat you are caught unaware by a pack of wolves. (Discuss the increased used of remote locations by people for recreation, the principles of eco-tourism and how our uses affect the landscape both directly and indirectly).
The lichen that makes up most of your food grows slowly. As it grows it absorbs nutrients from the air and soil over decades. Along with the air the lichen absorbs tiny particles of pollution. As you eat your way through two garbage bags of your favourite food, tiny bits of pollution can add up and add up. You’re slowly poisoned a little bit at a time. (Note: this has not proved to be a problem in Manitoba yet but it is happening in other parts of Canada. Discuss the effects of bio-accumulation and how pollution can travel to remote areas).

You’re a master of your domain. You know every creek, bog, path and rock ridge of your territory. This knowledge has been gained over many years of roaming throughout your range. Eventually the advantage of knowledge won’t be able to outweigh the stress of age. (Discuss how wild animals have shorter life spans than captive or domestic and brainstorm the causes).

The forest is a land of vast resources and Woodland Caribou are not the only ones who see the forest as more than just trees. Forestry companies require the wood resources. In your territory you have seen the effects of forestry both positive and negative. The removal of old trees open up the canopy and allows light to reach the forest floor renewing the lichen on the rocks. Removing old trees can lessen the hazards of fire by removing fuel that could spread wildfire. But, forestry is a noisy business and you have to avoid the active areas. This extra travelling could be deadly if you can’t find a new feeding area soon. (Discuss ways to lessen the impact of timber harvesting in an area.)

As a Woodland Caribou you are a specialist. You live in many different areas that are inhospitable to other species. You can eat lichen, trudge though the snow with ease and keep warm in places that Moose cannot. Your highly adaptable relative the White-tailed Deer does not often frequent your territory but you have noticed more and more signs of them (scat and tracks). Changes in your habitat have allowed the deer to extend their range. They feed on the same soft sedges that you like. Their leftovers leave something else though. While feeding on herbs and mushrooms you pick up a parasite carried by White-tailed Deer and as you feast you become host to something that you have no defence against. (Discuss the Brainworm parasite including its life cycle and effects on caribou and moose).

Colours: Photocopy and cut out.

ORANGE • BROWN
PURPLE • RED
GREEN • PINK
BLUE • YELLOW
PART 2 - CARIBOU HABITAT RUMMY

Ages: Grades 4 and up  
Subject: Science  
Group Size: 4 participants per set of cards.  
Setting: Indoors  
Objectives: Students will be able to:  
   • Recognize that Woodland Caribou live in Manitoba.  
   • Identify the components of habitat.  
   • Identify specific habitat requirements of Woodland Caribou in eastern Manitoba.  
   • Understand that habitat limits an animal’s ability to survive.  
   • Understand that the habitat of the Woodland Caribou is complicated.  
   • Conclude that there are threats to Caribou habitat and deduce what those threats may be.  
   • Design methods to limit the threats to habitat.  

Method: Students play a version of the children’s game rummy. They collect the components of habitat to form hands and gain points.

Background Information:  
Habitat: All living things require a habitat or home. The size of an animal’s habitat depends on how much land it takes to get enough of each requirement in order to survive and reproduce. Woodland Caribou often require vast tracks of undeveloped land in order to survive. Their components (or pieces) of habitat are easily disturbed by development. Woodland Caribou were placed on the federal Endangered Species List under the Species at Risk Act (or S.A.R.A.) in 2005 as threatened. They were listed on the Manitoba Endangered Species Act (M.E.S.A.) in June, 2006 as threatened.

The challenges facing Boreal Woodland Caribou are complex. Without enough food, water, shelter and space they simply can’t survive. In order to properly understand the needs of Boreal Woodland Caribou wildlife biologists have spent considerable time defining their habitat requirements. We have to know what caribou need before we can protect these areas. The areas that Woodland Caribou use are unique. Due to the harsh conditions of the ecosystem in which they reside these areas also are much larger than that used by other animals.

Development, natural disasters and diseases may also fragment pieces of habitat from one another. The following game provides a simplistic view of habitat but it is a good start.

Lack of habitat is the leading reason of extinction! Without a home they have to adapt, move or die. Caribou are highly adapted to their environment and cannot readily move to other areas.

Food: Woodland Caribou traditionally live in areas that can not be populated by other ungulates (members of the deer family) due to low food supplies in the winter. They have adapted to this by eating vast amounts of lichen in the winter. Lichen are unique organisms – a mixture of fungi and algae living together. The algae are a green plant andcreate food through photosynthesis. The fungi provide the algae with protection from the elements, a place to live and the ability to store water. These hardy organisms are just that – hardy and hard to digest. Caribou have special enzymes in their stomach compartments that allow them to digest and absorb the nutrients in the lichen. Lichen can grow almost anywhere but prefer large stands of open rock in mature forests. The Boreal Forest has a relatively short summer season. Caribou take advantage of the increased diversity of foods available in the warmer months by eating leaves, forbs (small forest plants), mushrooms and berries. They quickly return to depending on lichen when food sources become scarce.
**Water:** Water is required for all life. Caribou are about 70% water. Availability of clean water within their home range is vital. Within eastern Manitoba there is a vast amount of water available to the wildlife that reside there. The landscape of the shield and Boreal Forest was shaped 10,000 years ago by the last glacial period. The weight of the ice left narrow depressions that quickly filled with water to become the hundreds of lakes in the region. All these lakes are connected and form part of the Lake Winnipeg Watershed. The lakes in the region are connected by streams, rivers and wetlands. Wetlands provide valuable filtration systems and water retention for these shallow bodies of water.

**Shelter:** Manitoba is a land of extremes. Hot and often dry summers are opposite to cold and snowy winters. Caribou require protection from the elements just like people. Although they are specially adapted to the weather extremes can still cause many problems. The forest helps to lesson the direct impacts of the weather. Sheltered forest areas keep snow from piling up and create cratering areas for caribou to dig for Lichen. Islands on lakes are like castles with a moat. They provide protection against predators during calving season. Jack Pine stands shelter the winter-adapted Caribou from the August heat.

**Space:** Although they don’t make large migrations, like the Barren-Ground Caribou of northern Manitoba, Boreal Woodland Caribou still require vast tracts of land. Without enough space they can’t find the other three components of their home. Think of this like a closet. If you placed adequate food, water and shelter in the closet, 30 adults still could not live there. They would not have enough space. The Woodland Caribou of eastern Manitoba require about 2400 km² per herd in order to survive. This is an area just larger than Whiteshell Provincial Park. These areas can increase or decrease in size depending on the quality and quantity of food, water and shelter available within the space. Woodland Caribou migrate (or move) within their space to find what they need at certain times of the year. Grounds are required for calving, rearing or young, summer, rutting, wintering and travel corridors to get from each area.

**Balance:** Each part needs to be in balance or properly arranged in order for caribou to thrive or even survive. Development within caribou habitat threatens their food, water, shelter and space and the balance that they require. The balance is like a recipe, If you have all the ingredients without the correct amounts you will not get the desired result.

**Materials:**
- 1 deck of cards per 4-6 students - Cards should be photocopied from the originals provided. Cards should be laminated for durability if you are planning on using them again. You may want to have students make their own cards to take home. Instructions for making cards are found on the card template.
- Paper and pencil to keep score (optional)
- Master Sheet (teacher reference)
- Caribou Habitat Rummy Poster (student reference)

**Play Procedure:**
Students should be familiar with Woodland Caribou and the components of habitat prior to playing the game. The habitat rummy master sheet may be handed-out or displayed to help students make hands.
• Students deal out 5 cards per player, one card face up in the middle (for the discard pile) and place the rest of the deck face down. See play lay-out.

• The object of the game is to get a set of habitat requirements and a Woodland Caribou.

• The player on the dealer’s left (player 1 in the play lay-out) starts the game. They must pick-up one card. Each time you pick up you have the choice of either choosing the face-up card from the discard pile or one from the deck. They then must discard one card from their hand that they do not need (you must always discard).

• Play proceeds to the left until someone gets 5 cards that create a habitat and a caribou (one caribou card, one food card, one water card, one shelter card and one space card). They then call out “Habitat Rummy” and score one point (optional).

• Play starts over with the dealer rotating to the left.

• Alternatively, the player who called rummy may simply pick up five new cards and play may continue until the deck is exhausted and 12 habitat matches are made. (The discard deck may be shuffled if the pile runs out). Count one point per habitat set collected (there are 12 points available in total).

• Wild Cards may be drawn throughout the game. These cards help to simulate the problems that may plague caribou in their habitat. Follow the instructions on the cards. Once a Wild Card has been discarded it may not be picked up by another player. If the player discards a regular card (caribou, food, water, shelter or space) on the top of the discard pile it may be picked up by the next player. Wild Cards are the only time that two cards may be discarded.

**Play Lay-out:**

**Wrap-up:**

Designate a time restriction or a point goal to indicate the end of the game. The emphasis of the game should be placed on the different habitat requirements of caribou and not necessarily on who won and who lost. Ask the students about the habitat hands that they created. Is each hand a complete picture of the home of Woodland Caribou? (The answer is no). What about the whole deck? Woodland Caribou have many special adaptations to the habitat they live in. These specializations make them the best at living where they do but do not make it easily for them to move elsewhere.
Ask the students if anyone picked up a Wild Card? Was it hard to re-coup from those losses? Was it a disadvantage for collecting habitat points?

Brainstorm with participants on way to mitigate the effects of the Wild Cards or problems faced by Woodland Caribou. The answers to this may be very complicated just in real life. Encourage them to ask for more information if they need it. Some ideas include:

Predators: Predators take heavy tolls on Woodland Caribou. Woodland Caribou protect themselves from predators by living in areas separate from other major prey species (i.e. White-tailed Deer and Moose). Ask students ways that you could keep other prey species separate from caribou. Ideas include managing the forest in a way that makes it suitable for only caribou (more old growth, less new), increased hunting of White-tailed Deer and Moose, protect travel corridors and protect large tract of land so that caribou have a large habitat to roam.

Pollution: Lichen are slow growing. They absorb much of their water and nutrients from the air. This can cause pollution to build-up in the lichen and then build-up in the caribou (as they eat incredible amounts of it). Although lichens are not the only food source of the caribou, they are a staple and without it Caribou cannot survive. Currently, this is not a problem for caribou in eastern Manitoba but it is becoming a concern for other caribou throughout Canada. Ask students ways that they can prevent this from effecting our Caribou. Ideas include monitoring current air quality, learning more about what is happening in other areas and it’s effects, and encourage ways to reduce air pollution both from large business and individuals.

Drought: The Boreal Forest is a habitat of extremes. Cold snowy winters are often followed by hot, dry summers. Ask your students how can we mitigate the effects of a drought? Ideas may include: leaving and protecting wetlands, protecting water quality, monitoring Caribou use of water sources and then protecting water source from development or disturbance.

Wildfire: Wildfire is part of the natural cycle in the forest. Fire helps to rejuvenate the forest and make new growth. The forest is a living thing and succession is an important part of the cycle. However, Caribou use older growth forests that are over 50 years old as these are lichen rich areas. Too many fires may make too much habitat unsuitable now when Caribou need. In Manitoba 2/3 of all fires are started by people not by lighting fires can be devastating to people and property. Ask the students to think of ways to manage fire in the forest. Ideas include education to prevent human caused fires, designating some areas as burn areas, using forestry techniques to emulate fires and replanting areas with to ensure a forest for later.

Development: Caribou are very sensitive to development. Caribou may avoid these areas due to noise, increased chances of being hit by a vehicle, less suitable habitat, increases in other species (White-tailed Deer) that tolerate people better than caribou and increased predators. Ask your students how should we or should we develop areas that are prime caribou habitat. Remember that some of these areas may be parks or areas that are already developed and people should be thought about too! Ideas may include: closing all areas for caribou, closing some areas during critical times, limiting the types of development and use or an area (no power boats or no motorized vehicles) and studying the effects of development find ways to build them better.
Explain to students that they have just taken on the role of a wildlife biologist trying to help Woodland Caribou. By understanding the habitat that caribou live in and the threats to that habitat it allows us to make better decisions regarding land use. The list above is not comprehensive list. Your students may have many more ideas that are great.

Follow-up Activities:
The issue of caribou habitat is very complex. Caribou have very complex and specific needs. The following activities are suggestions to help your students gain a more in-depth knowledge of caribou habitat.

• Brainstorm ways to protect habitat and then design an advertisement to inform people about how they can help.
• Map-out the space of an average caribou herd and place this map on a transparency. Then map out local areas using the same scale. You could use Winnipeg, Whiteshell Provincial Park, Lake Winnipeg, Brandon or Hecla Island. Place the two together and compare how much space they require.
• Discover other species in the Boreal Forest that are vulnerable, threatened, endangered, extirpated and extinct. Compare the problems they face to the ones that challenge caribou. Are they the same or different?
• Research the life cycle of a Jack Pine tree. Include it’s characteristics (soil type, shape), role of fire and it’s life span. How can we emulate the life process without using fire?
<table>
<thead>
<tr>
<th>Species</th>
<th>Food</th>
<th>Water</th>
<th>Shelter</th>
<th>Space</th>
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<tr>
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<td>Lichens</td>
<td>Lakes</td>
<td>Boreal Forest</td>
<td>GPS Collars</td>
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<td>Leaves</td>
<td>Streams</td>
<td>Shield Region</td>
<td>Manitoba/Ontario</td>
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<td>Grasses</td>
<td>Wetlands</td>
<td>Treed Muskeg</td>
<td>Winter Corridors</td>
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<td>Frozen Lakes</td>
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<td>Rivers</td>
<td>Jack Pine Stands</td>
<td>Low Snow Amounts</td>
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<td>Lakeshores</td>
<td>Home Range</td>
<td>Remote Areas</td>
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<tr>
<td></td>
<td>Sedges</td>
<td>Streams</td>
<td>Travel Corridors</td>
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<td>Provincial Parks</td>
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<td>Reindeer Moss</td>
<td>Lakes</td>
<td>Shield Region</td>
<td>Protected Areas</td>
</tr>
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</table>

Wild Card
Predators eat on your Caribou.

Wild Card
Snow too deep! Can't find Lichen.

Wild Card
Drought! Your favourite spot to drink is dry!

Wild Card
Wildfire
New Campground

Manitoba Model Forest
### Rivers
- Less than 1% of all water on earth is freshwater.
- Rivers provide important pathways for migrating fish.

### Drought!
- Your favourite sport to drink dry.

### Wild Card
- Drought is a word that refers to the Greek god Boreas (the god of the north wind), and is often crossing the Manitoba Ontario border.

### Remote Areas
- Isolated areas are often great spots for fishing. Caribou may avoid these busy areas.

### Streams
- Streams are small rivers that may dry up in hot seasons.

### Rock Outcrops
- Jack Pine stands are over 50 years old which provide shelter from predators.

### Undeveloped Areas
- Caribou prefer stands of Jack Pine that are over 50 years old which provide shelter from predators.

### Wetlands
- Wetlands are a divided into different types including swamps, marshes, and fens.

### Islands
- Islands provide important shelter from predators.

### Jack Pine cones open in the winter months.

### Reindeer Moss is not a moss but a lichen with a fluffy appearance.

### Mushrooms grow widely.

### Willow leaves can grow up to one meter in a single season.

### Reindeer Moss is a lichen with a fluffy appearance.

### Spruce trees thrive in bogs.

### Snow is too deep, can’t find lichen.

### Wildfire!
- There are many important areas that are covered by both water and land.

### WetОсlands
- Wetlands hold water from heavy rainfalls and store it. The water cycle moves precipitations and transpiration.

### Shield Region
- The northernmost part of Manitoba is the Shield Region. Provinces - Nopiming, Atikaki and Paint Lake.

### The Shield Region is known for it's circumpolar habitat as it circle the arctic.

### Snow is too deep, can’t find lichen.

### Woodland Caribou
- Woodland Caribou are the largest sub-species (or type) of caribou.

### Wild Card
- Wild Card

### Woodland Caribou are called ungulates which is Latin for hoof.

### The summer diet of Woodland Caribou includes mushrooms, mosses, and lichen.

### Wild Card
- Wild Card

### Lichens
- Lichens are combinations of fungi and algae.

### Muskox is a word that refers to moss-lined bogs and swamps.

### Wild Card
- Wild Card

### Wild Card
- Wild Card
INSTRUCTIONS:
Print out one copy of this sheet per deck of cards. Cut-out and glue to construction paper or laminate.
Woodland Caribou are related to deer, moose and elk. We call them caribou in North America and reindeer in Europe. Woodland Caribou are unique. Both the females and males have antlers. Woodland Caribou are listed as threatened under the Species At Risk Act (S.A.R.A.).

Woodland Caribou are called ungulates which is Latin for hoof. Woodland Caribou usually only have one young at a time. Young are call calves.
Woodland Caribou

Caribou are adapted to living in the Boreal Forest.

Woodland Caribou

Caribou have lived in North America during the last two ice ages.

Woodland Caribou

The southern most herd of Woodland Caribou in Manitoba is the Owl Lake herd.

Woodland Caribou

Woodland Caribou live in small herds that can travel easily and avoid predators.

Woodland Caribou

One-sub-species (type) of caribou are extinct, the Queen Charlotte Island Herd.

Woodland Caribou

Woodland Caribou are the largest sub-species (type) of caribou.

INSTRUCTIONS:
Print out one copy of this sheet per deck of cards. Cut-out and glue to construction paper or laminate.
Reindeer moss is not a moss but a lichen with a fluffy appearance.

Mushrooms grow widely after rains.

Sedges are grass-like plants.

Willow leaves

Willow trees can grow up to 1 meter in a single season.

Grasses

Grasses are meant to be eaten. Grasses grow back thicker and stronger after trimmings.

Horsetails

The horsetail family of plants is over 400 million years old.
The summer diet of Woodland Caribou includes leaves and tree buds.

Arboreal Lichens are tree lichens.

Lichens are a combination of fungi and algae.

There are thousands of different lichens in the world.

Lichens are very slow growing. A 10 cm patch may be 1000 years old!

Caribou need to eat about 3 kgs or 2 garbage bags of lichen a day.
INSTRUCTIONS:
Print out one copy of this sheet per deck of cards. Cut-out and glue to construction paper or laminate.

Streams:
Streams are small rivers that may dry up in hot seasons.

Rivers:
Wetlands hold water from heavy rainfalls and store it. Less than 1% of water on Earth is drinkable.

Lakes:
The lakes in Manitoba are left-over from when glaciers covered the area. Only 2.7% of all the water on Earth is freshwater.

Wetlands:
Wetlands are divided into different types: swamps, bogs, marshes and fens.
The water cycle moves water through evaporation, transportation and precipitation.

Wetlands are areas that are covered by both water and plants.

38% of Manitoba’s Boreal Forest is covered by wetlands.

Lakes that caribou need are often great spots for angling. Caribou may avoid these busy areas.

All water in Manitoba flows north. We are the only province in Canada where this happens.

Canada has 3% of all the wetlands in the world.
Islands provide important shelter from predators when calving.

Eastern Manitoba has very thin soil. The plants are adapted to growing without it.

Caribou prefer stands of Jack Pine that are over 50 years old which provide lots of lichen.

Spruce trees thrive in bogs and have square needles.

Places where land and water meet are called riparian zones and are referred to as ribbons of life.

The Boreal Forest is a circumpolar habitat as it circles the arctic.
INSTRUCTIONS:
Print out one copy of this sheet per deck of cards. Cut-out and glue to construction paper or laminate.

Frozen lakes are used as loafing sites to gather up winter rays of sunshine.

The Shield Region is known for the rock that is visible. It's name comes from it's curved shape.

Muskeg is a word that refers to moss lined bogs and swamps.

Woodland Caribou raise their young near bogs and lakes for an easy escape from predators.

The Boreal Forest is named for the Greek god Boreas (the god of the north winds).

Jack Pine cones open in extreme heat.
These areas have been recognized as being unique, important and possibly threatened in Manitoba.

Caribou may be found in 3 Provincial Parks - Nopiming, Atikaki and Paint Lake.

Caribou numbers may drop if habitat is developed.

Caribou used to be found much farther south than they are now. As areas become more accessible they have to leave.

Caribou use their hooves as shovels to crater (dig holes) in the snow to find lichen.

2400 km² is the average amount of space needed by Woodland Caribou in Eastern Manitoba.
INSTRUCTIONS:
Print out one copy of this sheet per deck of cards. Cut-out and glue to construction paper or laminate.

Woodland Caribou may travel as far as 50 km to their favourite areas.

GPS collars have been attached to caribou in eastern Manitoba to collect data.

Caribou know no borders, often crossing the Manitoba and Ontario border.

Nopiming is Anishinabe for "entrance to the wilderness".
**INSTRUCTIONS:**
Print out one copy of this sheet per deck of cards. Cut-out and glue to construction paper or laminate.
INSTRUCTIONS:
Print out one copy of this sheet per deck of cards. Cut-out and glue to construction paper or laminate.
PART 3 - THE BOREAL TREK - A WOODLAND CARIBOU MIGRATION GAME

OVERVIEW AND OBJECTIVES
This game provides students with a fun way to learn about forest ecology, Boreal Woodland caribou biology, the forces of nature, and the struggle for survival in the wild. Each player starts out with a herd of caribou (3 tokens). The first player to cross the finish line with the entire herd is the winner. Along the way, each player’s herd will encounter conditions, both favorable and unfavorable, that actual caribou would realistically encounter as they move from summer range to winter range in a typical year.

GRADE LEVEL: This game is suitable for Grades 5 and up.

TIME ALLOTMENT: It takes approximately 5 minutes to set up the game, and approximately 30 minutes to play it.

PRE-GAME THEORY AND CONTENT:
• Woodland Caribou live in the Boreal Forest, and are adapted to its harsh conditions. A long cold winter, with deep snow can make survival difficult. In its habitat, the Boreal Woodland Caribou will make a relatively short migration from its winter range to its summer range. This migration ensures that individual Caribou meet their needs, primarily food, shelter, and avoidance of predators.
• There is a tremendous need to conserve energy during the long winter.
• Woodland Caribou are social creatures, and will travel in small groups. However, during the mating season the bulls will travel widely seeking out females that are ready to breed.
• Predators include such animals as the Timber Wolf, and the Black Bear, which prefers to attack young calves.
• A variety of diseases affect all animals, including the Woodland Caribou.
• The preferred food of the Woodland Caribou are lichen, and they are unique in that they are able to digest these plants.
• The lichen that Caribou eat grows on older than average spruce and pine approximately 60 – 80 years old, so they need older forests to live in.
• Woodland Caribou have a very low reproductive capacity. They mature slowly, and usually have only one calf per year.
• Natural events such as wildfire and intense windstorms can destroy habitat for the Caribou.
• Woodland Caribou do not handle human caused disturbances very well, such as road building, cottage developments, and resource extraction (logging, mining).

HOW TO PLAY THE GAME:
Each player will place their tokens behind the Start Line, which is in the Caribou’s winter range. Each player will shake the dice three times, each time moving one token (one token = one Caribou). Follow the instructions written in the appropriate square that you land on. If you land on a Wild Card, you must follow the specific instructions stated, and will result in you moving forward, or moving backward. This will sometimes break up the herd, something that actually happens in reality. Sometimes the herd will gather again and continue, and sometimes herds will break apart into smaller subgroups. The winner is the first player to have the entire herd (all 3 Caribou) cross the finish line, although not necessarily at the same time. In nature there are often stragglers, that face extra danger because there is safety in numbers. Crossing the finish line into the Summer Range means that weather conditions are better, food is more abundant, and generally life for the Caribou is a little easier. You have therefore won (for the time being) the struggle to survive. Out in the wild, it really is “SURVIVAL OF THE FITTEST”
Wild Cards for the Boreal Trek Game. Copy then cut out.

A new cottage subdivision is built on your traditional calving lake. You abandon the lake and look elsewhere to give birth: Move back 4.

A fire in your summer range has improved moose habitat. Moose, as well as wolf and bear numbers have increased: Move back 4.

Your calf is injured by a fall on some rocks. Move back 1.

A tornado has dropped a large number of trees which are now obstructing your movement. You avoid these areas... Lose a turn.

Very low snowfall this winter has made it easier for wolves to travel. Move back 3.

Two years of very dry weather have increased the possibility of a very large wildfire. Move back 3.

A new management strategy has identified actions to protect caribou habitat. Move ahead 1.

Research identifies critical habitat and works to protect it. Move ahead 5.

Very low snowfall this winter has made it easier for wolves to travel. Move back 3.

The risk of contacting Brainworm increases due to White-tailed Deer entering your range. Lose a turn.

Food is plentiful. Move ahead 1.

A fire in your summer range has improved moose habitat. Moose, as well as wolf and bear numbers have increased: Move back 4.

Your calf is injured by a fall on some rocks. Move back 1.

A new management strategy has identified actions to protect caribou habitat. Move ahead 1.

Research identifies critical habitat and works to protect it. Move ahead 5.
SECTION 6: GLOSSARY

ABOREAL (lichen): Lichen that is found on trees.
ADAPTED or ADAPTATION: The process of making adjustments to the environment
ALTERNATE PREY SPECIES: These are species that may be targeted by the same predators as Woodland Caribou
AT RISK: A species of wildlife that is not yet extinct, but may be extirpated, endangered, threatened, or of special concern
BIODIVERSITY: The variety of life on earth, different species, genetic variability from one individual to another, and the variety of ecosystems in which they live
BIOLOGIST: A person who studies living organisms and their relationships to one another
BRAINWORM: A parasite that attacks the brain of the Woodland Caribou and Moose. It is hosted in the White-tailed Deer without harm to the deer.
BREEDING: A series of behaviours from courtship to rearing of young which are necessary for the continuation of the species
BOREAL FOREST: The northernmost zone of forest cover consisting of mixed coniferous and deciduous trees that stretches in a broad belt across North America, Europe, and Asia
CALVING SITES: A place where females go to have their young. Small islands are preferred by the Woodland Caribou, since they are relatively safe from predators
CARRYING CAPACITY: The number of individuals that a given ecosystem is capable of supporting.
CONSERVATION: The maintenance of environmental quality, diversity, and resources through the management of human activities
COSEWIC: The Committee on the Status of Endangered Wildlife in Canada. COSEWIC is a committee that assesses species that are at risk.
CRATERING: The act of digging through the snow to find lichen
DE-LISTED: To be taken off the Species at Risk list
DOWN-LISTED: Being assigned a safer category on the Species at Risk list (e.g. from endangered to threatened)
DYNAMIC: Constantly changing, such as an ecosystem
ECOLOGICAL INTEGRITY: A condition that is determined to be characteristic of its natural region and likely to persist: specifically when the structure and function of the ecosystems are not being stressed by human activity
ECOSYSTEM: An interdependent and dynamic system of living organisms with their physical and geographical environment
ENDANGERED SPECIES: A species native and confined to a certain region; it usually has a comparatively restricted distribution
ENZYME: A specific protein that carries out reactions in cells and organs, either putting molecules together (anabolic) or breaking them apart (catabolic)
ENDANGERED: A wildlife species facing imminent extirpation or extinction
ESTROUS: A state of heightened reproductive behaviour during mating season
ENDANGERED SPACES: Threatened natural areas, such as tall grass prairie or old growth forests, and wetlands
EXTINCT: A species no longer found anywhere on earth
EXTIRPATED: A species that no longer exists in the wild in Canada, but exists elsewhere in the wild
FOREST: Large area of land primarily covered with trees as well as other organisms
FOREST DISTURBANCE: A disturbance either natural or man made which destroys the existing forest and sets the stage for the regeneration of a new forest...e.g. fire, logging, windstorms
GESTATION PERIOD: The period of time between conception and birth
HABITAT: The arrangement of food, shelter, water, and space suitable for species survival
HABITAT ALTERATION: Changing vegetation on the landscape either through natural means (succession, natural disturbance) or man induced changes (logging)
HABITAT AVOIDANCE: The tendency for a species to avoid a certain area which no longer meets their needs
HOME RANGE: The areas in which an animal travels in the scope of normal activities, not to be confused with territory
HUNTING: The act of a person or animal who searches for wildlife with the intent of killing it
INDICATOR SPECIES: A species whose progress is monitored by people as an indication of what is happening to the environment as a whole
IN-SITU CONSERVATION: The conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings
INVASIVE SPECIES: A species that has moved into an area and reproduced so aggressively that it has replaced some of the original species
**KEYSTONE SPECIES:** A species whose loss from an ecosystem would cause a greater than average change in other species populations or ecosystem processes

**LICHEN:** Algae and fungi that have combined to form a distinct organism with characteristics of both

**LOSS OF HABITAT:** Loss of an area which no longer provides suitable habitat

**MATURE CONIFEROUS FOREST:** Boreal forest at the late stage of succession

**METABOLIC:** Refers to all the chemical processes in an organism ie. Digestion, fat storage, etc.

**MIGRATION:** The periodic movement of animals from one area to another and back again as a natural part of their life

**MORTALITY:** Death of an organism

**NATIVE SPECIES:** An indigenous species that is normally found in Canada

**NATURAL DISTURBANCE:** A force of nature altering the structure of the forest i.e. fire, windstorms, insect infestations,

**NICHE:** The place occupied by a species in its habitat, including the particular set of circumstances (chemical, physical and biological) that enable it to survive

**NON-NATIVE SPECIES:** A species that did not originally occur in the areas in which it is now found, but that arrived as a direct or indirect result of human activity. Example include Scots Pine, Purple Loosestrife, and the Asian Longhorn Beetle

**OLD GROWTH:** The final stage in the life span of a forest, characterized by very old trees with onset of decay

**POACHING:** Hunting without the legal right to do so

**PHEROMONE:** A hormone emitted by animals that brings about a certain behaviour in other members of its species i.e. reproduction

**PREDATOR:** A carnivore that hunts live prey (ie. wolves hunt caribou)

**RANGE:** The geographical limits of a species or group. A migratory species usually has both a breeding range and a wintering range.

**RECOVERY:** Conservation actions undertaken to benefit an endangered or threatened species until a sustainable population level of fit individuals has been reached and threats to the population have been controlled

**RECRUDED:** Added to the population either through birth or immigration

**REFUGE:** a site offering protection to a species

**RESTORATION:** Returning a degraded ecosystem or population back to its original condition

**RUT:** Refers to the breeding season for members of the deer family

**RUTTING AREAS:** Areas where mating and breeding take occur

**SPECIAL CONCERN:** A wildlife species that may become a threatened or endangered species because of a combination of biological factors and identified threats

**STEWARDSHIP:** Management of the heritage of our natural spaces, species and culture in such a way that it can be passed on to future Canadians intact

**SUBSPECIES:** A geographically limited subdivision of a species that is taxonomically different from other such subdivisions of the same species

**SUMMERING AREAS:** Areas of habitat primarily used in the summer months

**SUMMER HABITAT:** habitat that is suitable to be used by caribou in the summer

**SUMMER RANGE:** the area where members of a species gather, usually to take advantage of better weather and a better food supply

**SUSTAINABLE FOREST MANAGEMENT:** Management that maintains and enhances the long term health of forest ecosystems for the benefit of all living things, while providing environmental, economic, and social opportunities for present and future generations

**TERRESTRIAL (Lichen):** Lichen which grows on land

**TRAVEL CORRIDORS:** Narrow strips of vegetation used by wildlife to travel from one part of their home range to another. They provide protection from predators while they move about

**THREATENED:** A wildlife species likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction

**WILDFIRE:** fire which occurs in any natural area

**WINTER HABITAT:** Habitat that provides for the needs of wintering caribou

**WINTERING:** Refers to winter habitat

**WINTER RANGE:** The area where members of a migratory species gather, usually to escape predators and gain shelter from harsh winter conditions

**WOODLAND CARIBOU:** In Manitoba, a threatened species of ungulates (hoofed animal) found in the Boreal Forest