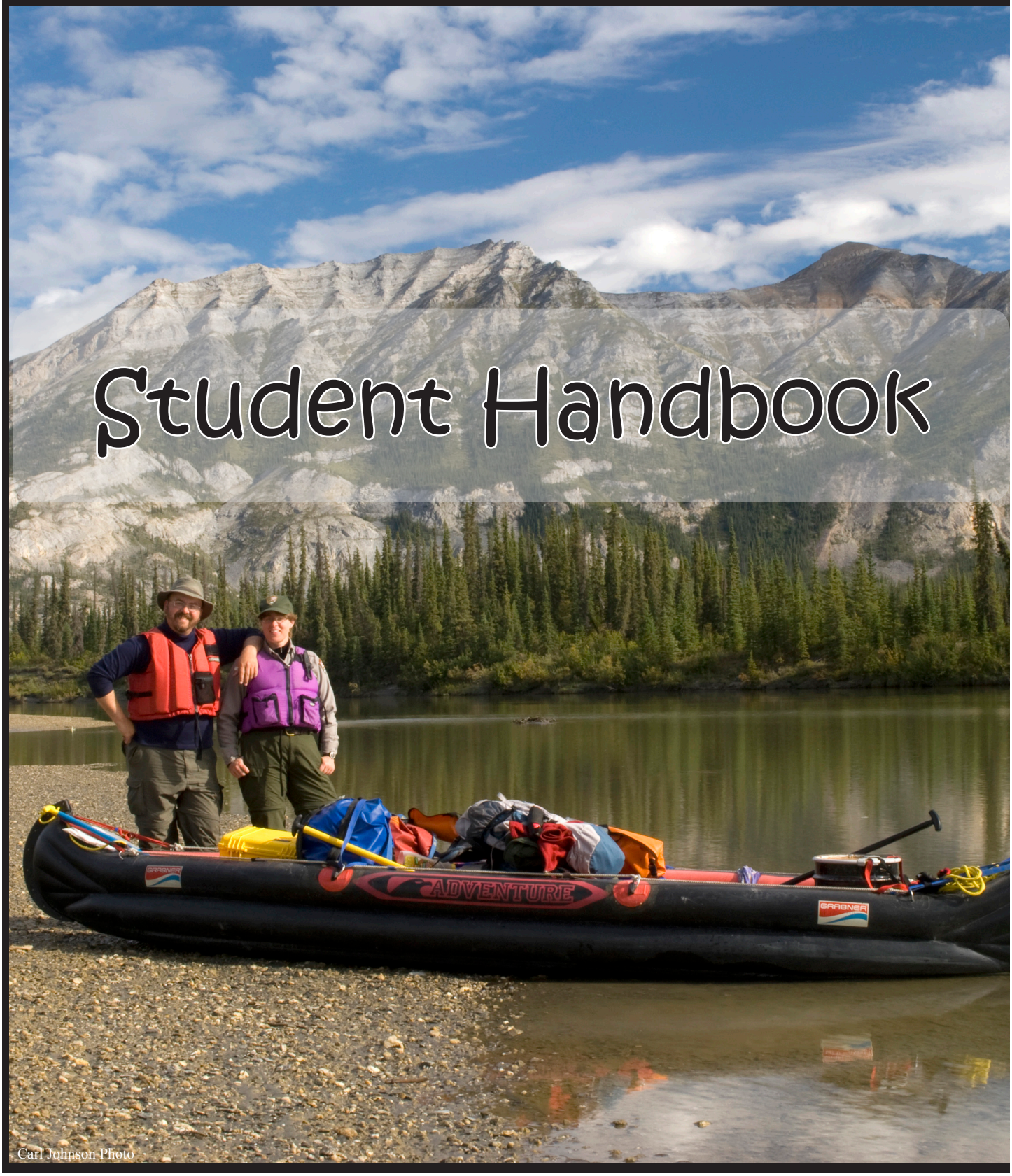
# Gates of the Arctic
National Park & Preserve

National Park Service
U.S. Department of the Interior

# Student Handbook



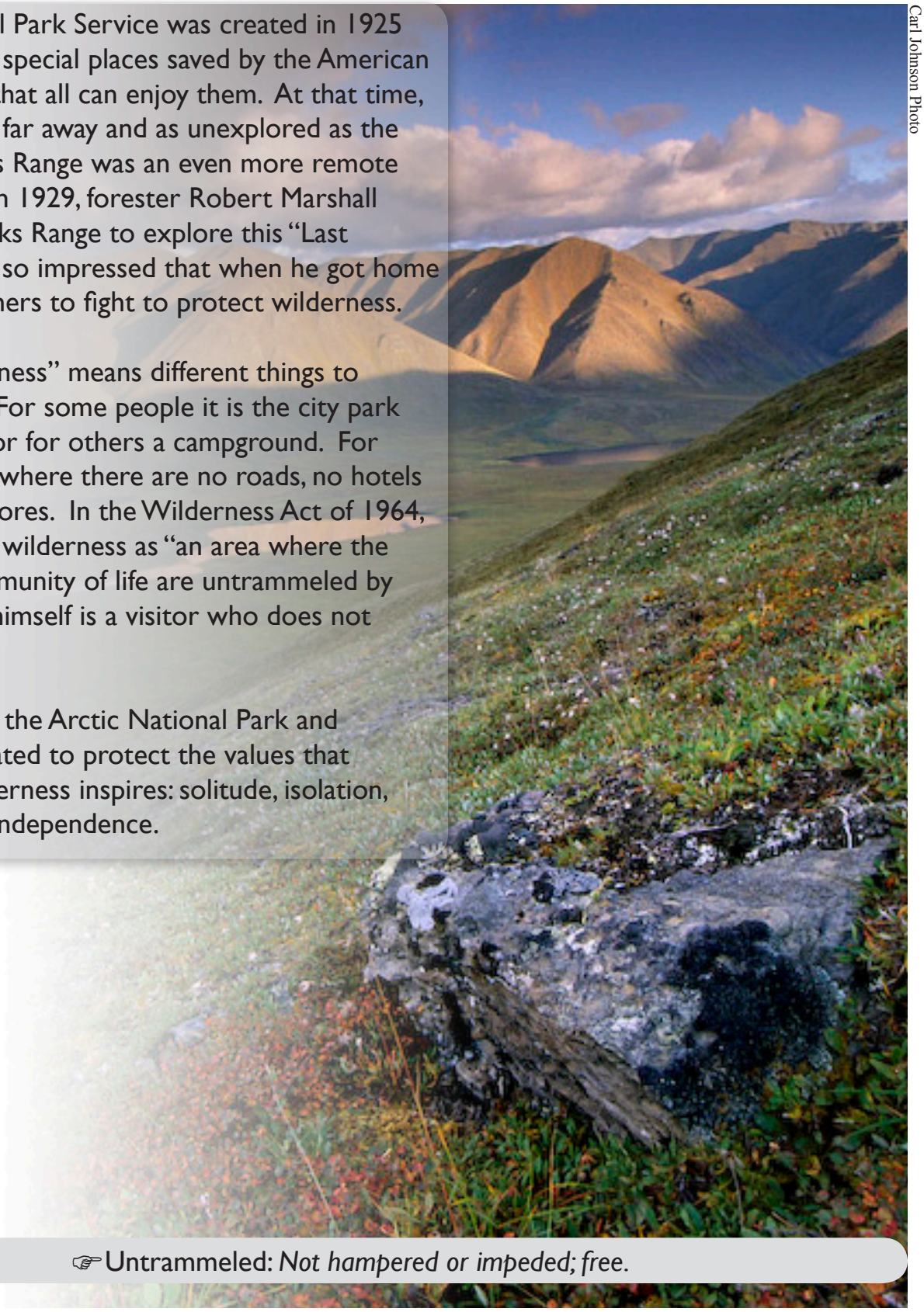

Carl Johnson Photo

# "Gates" to the Arctic

The National Park Service was created in 1925 to care for special places saved by the American people so that all can enjoy them. At that time, Alaska seemed as far away and as unexplored as the moon. The Brooks Range was an even more remote vast wilderness. In 1929, forester Robert Marshall came to the Brooks Range to explore this "Last Frontier." He was so impressed that when he got home he joined with others to fight to protect wilderness.

The word "wilderness" means different things to different people. For some people it is the city park down the street, or for others a campground. For some it is a place where there are no roads, no hotels and no grocery stores. In the Wilderness Act of 1964, Congress defined wilderness as "an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."

In 1980, Gates of the Arctic National Park and Preserve was created to protect the values that experiencing wilderness inspires: solitude, isolation, self-reliance, and independence.



Carl Johnson Photo

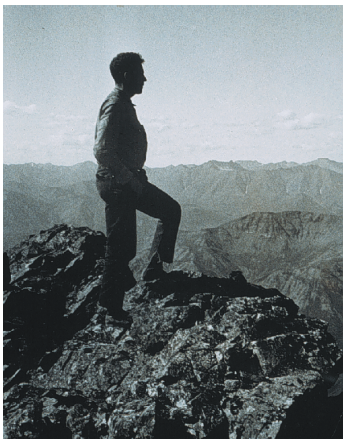
☞Untrammeled: *Not hampered or impeded; free.*

# A Wilderness Park


During one of his trips, Robert Marshall said Boreal Mountain and Frigid Crags looked like the "Gates of the Arctic."

*Although the Arctic Landscape is huge and seems unaffected by people, it is fragile and easily disturbed.*

Park rangers, biologists, archeologists, geologists, and other employees, together with the Alaskans who live in and around the park, work to take care of Gates of the Arctic. They protect the park's unique wilderness qualities as well as its physical resources including its land, wildlife and plant life. They also protect its cultural resources by helping to preserve the traditional way of life for the indigenous people who live in and near the park.



Robert Marshall

☞ Indigenous: *native or original.*

# Visiting the Wilderness

Former National Park Service employee John Kauffman called Gates of Arctic National Park and Preserve the "black-belt" park because there are no roads, hotels, campgrounds, stores, restaurants or even trails in the park. To get into the park you have to hike in five miles or fly a bush plane and land on a lake or gravel bar or in the winter on snow. You have to bring everything you need to survive. You also need to take care of yourself, because if you get hurt there is no guarantee that anyone will know for days or even weeks. Even in the summertime you have to be prepared for snow, rain or sunshine and the bugs can be very bad.

Despite the sometimes harsh weather, people come here to hike, mountain climb, and float the many scenic rivers in the summer. While many come to watch the caribou migration, others come to hunt in the Preserve areas. In the winter visitors enjoy dog sledding, skiing or snowshoeing in the Park. Although the number of visitors is small, they stay an average of 11 days, and some stay as long as a month. Along with enjoying the solitude, freedom, discovery, challenge and adventure here, visitors also help protect this vast and fragile wilderness.

*To help park rangers protect this special wilderness place, visitors are encouraged to:*

- Plan ahead and prepare.
- Travel and camp on durable surfaces.
- Dispose of waste properly.
- Leave what you find.
- Minimize campfire impacts.
- Respect wildlife.
- Be considerate of other visitors.


Carl Johnson Photo

# Across the Land Bridge

During the last ice age 12,000 years ago, much of the Earth's water was frozen, which caused lower sea levels. During this time there was a land bridge, more than a thousand miles wide, between Alaska and Siberia. Groups of people used this land bridge to travel to northwest Alaska. Many of these people moved south to other parts of the North American continent, but other groups stayed in the Arctic, adapting to the cold, harsh climate. The Bering Land Bridge is now covered by the Bering Sea.


Low sea levels made it possible to cross between Siberia and Alaska.

☞Learn more about the Bering Land Bridge National Preserve at www.nps.gov/bela

☞For more information about the prehistory of arctic Alaska visit this website: ***http://www.nps.gov/akso/akarc/***

## *Gates of the Arctic Timeline*

***Pre 1700s:*** *People have lived in the Brooks Range for at least 10,000 years.*

1700 1800 1850

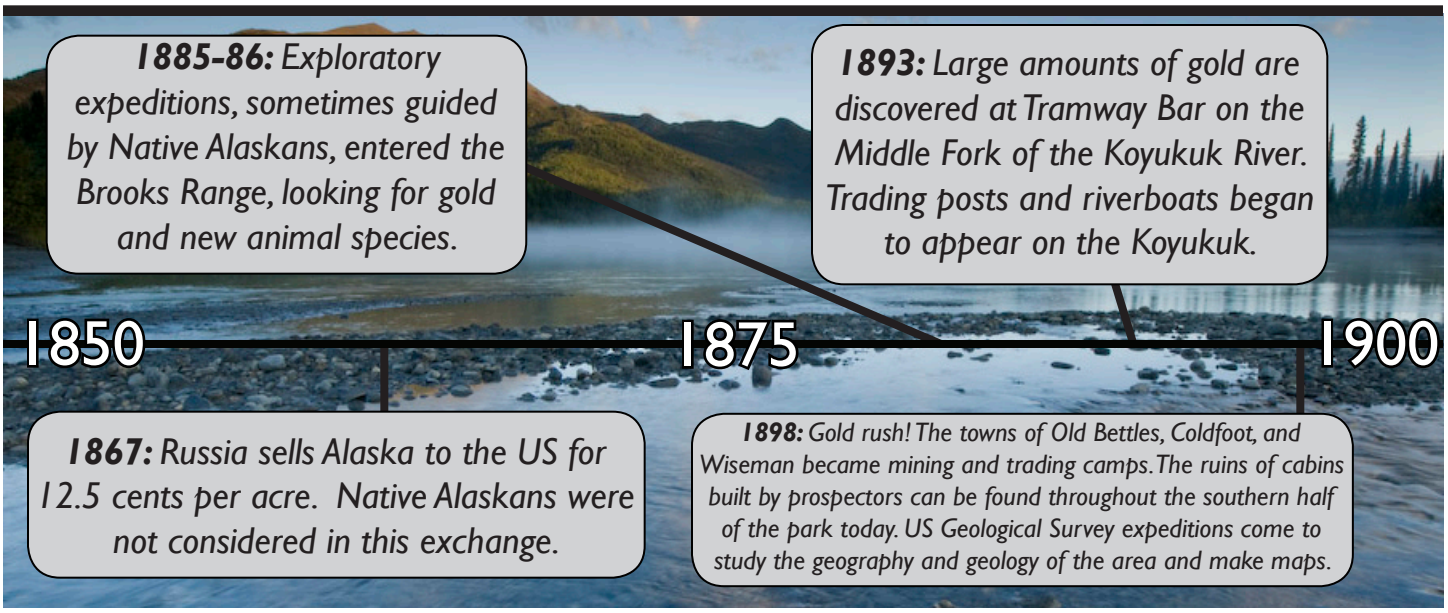
***1700s:*** *Russians claim Alaska as their territory, other nations also explore the coast and a little inland.*

Carl Johnson Photo

# People Lived Here...

The story of the early people of the central Brooks Range is still a mystery. Archeologists believe that people first moved here between 10,000 and 12,000 years ago. The park and preserve contain archeological sites of every cultural tradition known in northern Alaska. Park archeologists continue to gather information so that we may better understand the human history of the Brooks Range.

Many artifacts from all these Native groups are found within Gates of the Arctic National Park and Preserve. Archeologists, anthropologists and historians study these important sites, and it is essential that the sites are left undisturbed in respect for the cultures that came before and so that scientists may study the sites intact.




***1885-86:*** *Exploratory expeditions, sometimes guided by Native Alaskans, entered the Brooks Range, looking for gold and new animal species.*

***1893:*** *Large amounts of gold are discovered at Tramway Bar on the Middle Fork of the Koyukuk River. Trading posts and riverboats began to appear on the Koyukuk.*

***1867:*** *Russia sells Alaska to the US for 12.5 cents per acre. Native Alaskans were not considered in this exchange.*

***1898:*** *Gold rush! The towns of Old Bettles, Coldfoot, and Wiseman became mining and trading camps. The ruins of cabins built by prospectors can be found throughout the southern half of the park today. US Geological Survey expeditions come to study the geography and geology of the area and make maps.*

Carl Johnson Photo

# ...And They Still Do!

Anaktuvuk Pass chapel

The **Nunamiut Inupiat** are the descendants of these groups. In traditional times, they spent most of their time in the mountains and on the tundra, hunting, trapping, fishing and gathering plants. They stayed connected to other Eskimo groups by traveling and trading, sometimes as far as the Arctic Ocean. Today the Nunamiut Inupiat live inside the park in the village of Anaktuvuk Pass.

**Athabaskan** people have lived on the south side of the Brooks Range for at least a thousand years, and today they still live just outside the southern park boundary. Historically these people also hunted, trapped, fished and gathered plants in the Brooks Range. Like the Nunamiut, they still do.

In traditional times, Native people traveled in small family groups and carried their hide houses. Using the knowledge of the land passed down through many generations they went to where they knew they could find food. In the winter, lakes and rivers freeze and snow covers the ground. In traditional times, survival depended on knowing when and how to hunt different animals, or collect certain plants. Using willow bark nets in rivers, or willow fish traps, allowed people to harvest fish in large numbers.

☞ "Anaktuvuk" means "place of the caribou droppings."

1900

1925

1950

***1920s:*** *Most of the Nunamiut Inupiat Eskimos move from the Brooks Range to the Arctic coast due to the declining numbers of caribou. Bands of families continue to travel throughout the Brooks Range.*

***1924:*** *The Muries spend their honeymoon in the Brooks Range while Olaus studies caribou. They are inspired to work hard to convince the government to protect America's wild places.*

***1929:*** *Robert Marshall explores the North Fork Koyukuk area. He maps and names many peaks, creeks, and lakes and writes books about his travels and his experiences with local people. Most importantly, he writes about conserving the central Brooks Range and other wilderness areas.*

***1949:*** *Many of the Nunamiut Inupiat Eskimos that traveled out of the area move back and eventually settle in the valley of Anaktuvuk Pass. They are considered the last nomads of North America.*

Carl Johnson Photo

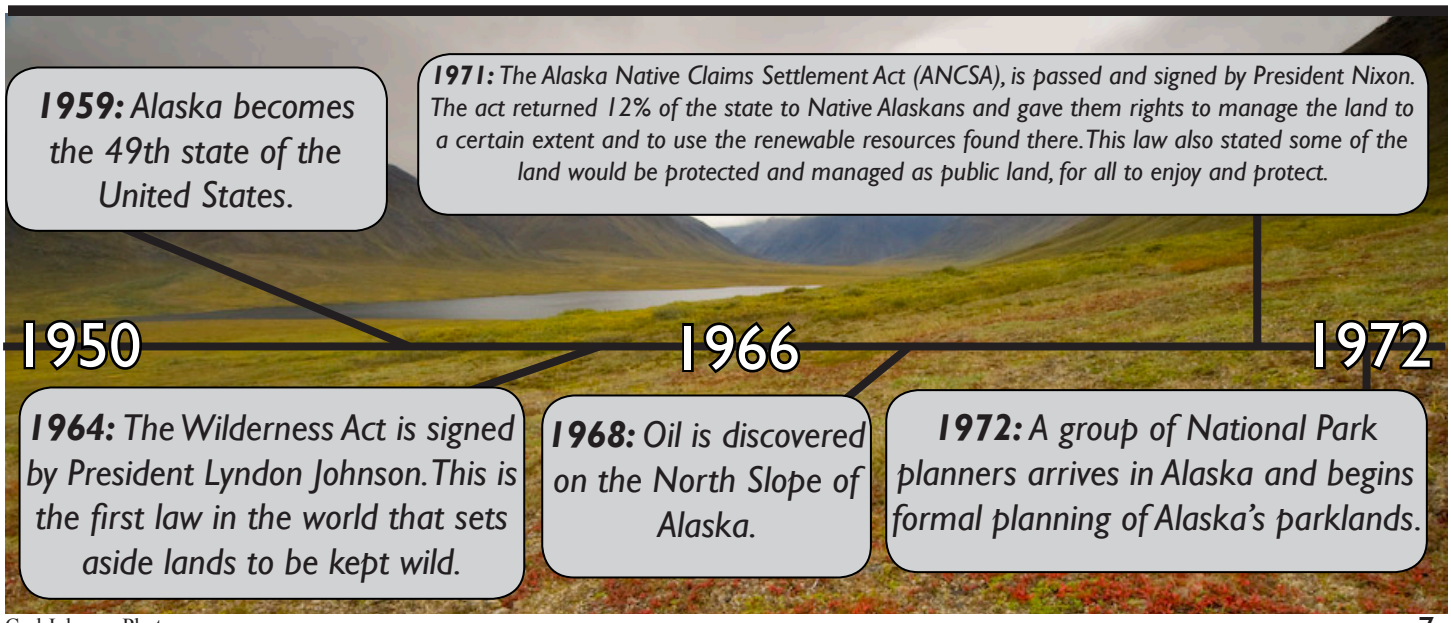
# The Subsistence Way of Life

People living in or around Gates of the Arctic still use the rich resources of the park: they fish, hunt, trap, and collect plants. This lifestyle, called **subsistence**, is similar to how people have lived in this area for thousands of years. Today, people travel by snow machine instead of using dog teams. Furs collected from traps are still used in clothing, but are also sold. The basic right to collect foods and necessities from the land is guaranteed in Gates of the Arctic.

Traditionally, preserving food throughout the seasons was essential. Berries were stored in seal oil, which was traded for spruce gum by inland people with coastal people. In the summer, deep holes were dug in the tundra, and food was stored in the permafrost, or frozen ground (see page 10). Some foods were kept in containers that were stored in the frigid rivers.

Drying, fermenting, or freezing fish in the permafrost were ways to store them for the winter. Moose or caribou was hung on drying racks for up to three weeks to preserve it for winter. Today people keep their harvest in freezers, or they smoke or dry it.

☞ Do you fish, hunt, or go berry picking? These are subsistence activities.



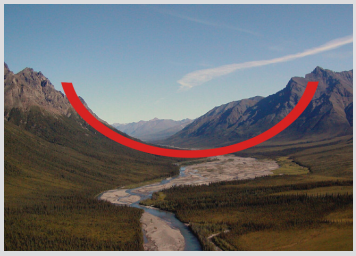

Carl Johnson Photo

# Geology: Mountains & Glaciers

The Brooks Range is named after Alfred Hulse Brooks, who was a geologist for the U.S. Geological Survey. Stretching 700 miles across the northern part of Alaska, it forms the northernmost mountain range in the world. It is comprised of two smaller ranges: the Endicott and the Schwatka, and is part of the larger Rocky Mountain system.

The Brooks Range is made up of layers that have been built up over hundreds of millions of years. These layers hardened into rock. The Earth's crust is made up of many pieces called "plates." These plates moved very slowly over hundreds of millions of years. When the plates collided, the land was pushed up forming wrinkles, like an accordion. This process is called plate tectonics. The wind, rain, snow and ice eroded away loose or softer layers of sediment revealing the wrinkles that are the foothills and rugged mountains you see today.

Glaciers were an important part of the formation of the Brooks Range. As snow falls in high mountain areas, where it doesn't melt, it becomes heavy and compresses into ice. As the ice becomes thicker and more snow falls on top, the weight of it forces it down the mountains. The glacier acts like a frozen river, slowly moving down between mountains and carving rock along the way. In the central Brooks Range these glaciers were sometimes two miles wide. Most of the glaciers in the park have melted.



When they melt, glaciers leave a "U" shape behind. The central Brooks Range is known for its wide U-shaped valleys.

**1973**

***1974:*** *The Dalton Highway is finished. It runs 800 miles from Prudhoe Bay to Valdez, built to haul supplies for the Trans-Alaska Pipeline. The Noatak Basin is named a Biosphere Reserve. The Noatak headwaters start in Gates of the Arctic National Park and Preserve and enter the Noatak National Preserve.*

***1975:*** *Construction starts on the Trans-Alaska Pipeline, a long pipe transporting oil from Prudhoe Bay to Valdez. The construction of this pipeline provides jobs to residents and nonresidents.*

**1980**

***1980:*** *The Alaska National Interest Lands Conservation Act (ANILCA) is signed by President Carter. This act protects much of Alaska's wilderness including the central Brooks Range. This is the final step in creating Gates of the Arctic National Park and Preserve, and several other parks and wildlife refuges in the state.*

**1986**

***1986:*** *The Simon Paneak Memorial Museum is opened in Anaktuvuk Pass, Alaska. The museum collection showcases the Nunamiut Inupiat Eskimo culture. The museum works closely with the community and is open year round to visitors.*

Carl Johnson Photo

# Permafrost & Fossils

Frozen ground, or **permafrost,** is what makes the Arctic unique, and determines which plants and animals make the Arctic their home. Like an underground freezer, permafrost is a layer of dirt and ice across the Arctic that stays frozen all year long. In the summer, only 6-8 inches of the ground thaws. The plants that grow insulate the ground, keeping it frozen. Because permafrost is frozen, water collects on top of flat ground instead of draining away. So although the Arctic is officially a desert, it has many boggy areas, wetlands, and small lakes.

☜ **Thermokarst**: an area where permafrost has melted.

Some **fossils**, mostly small invertebrates, can be found in Gates of the Arctic National Park and Preserve. Sometimes mammoth tusks or other remains from the last ice age are found when the permafrost, which has been preserving them for thousands of years, melts.

## *The Permafrost Landscape*

The arctic landscape is home to many landforms created by permafrost, including hills known as pingos (top) and ice wedge polygons (bottom).

# Climate

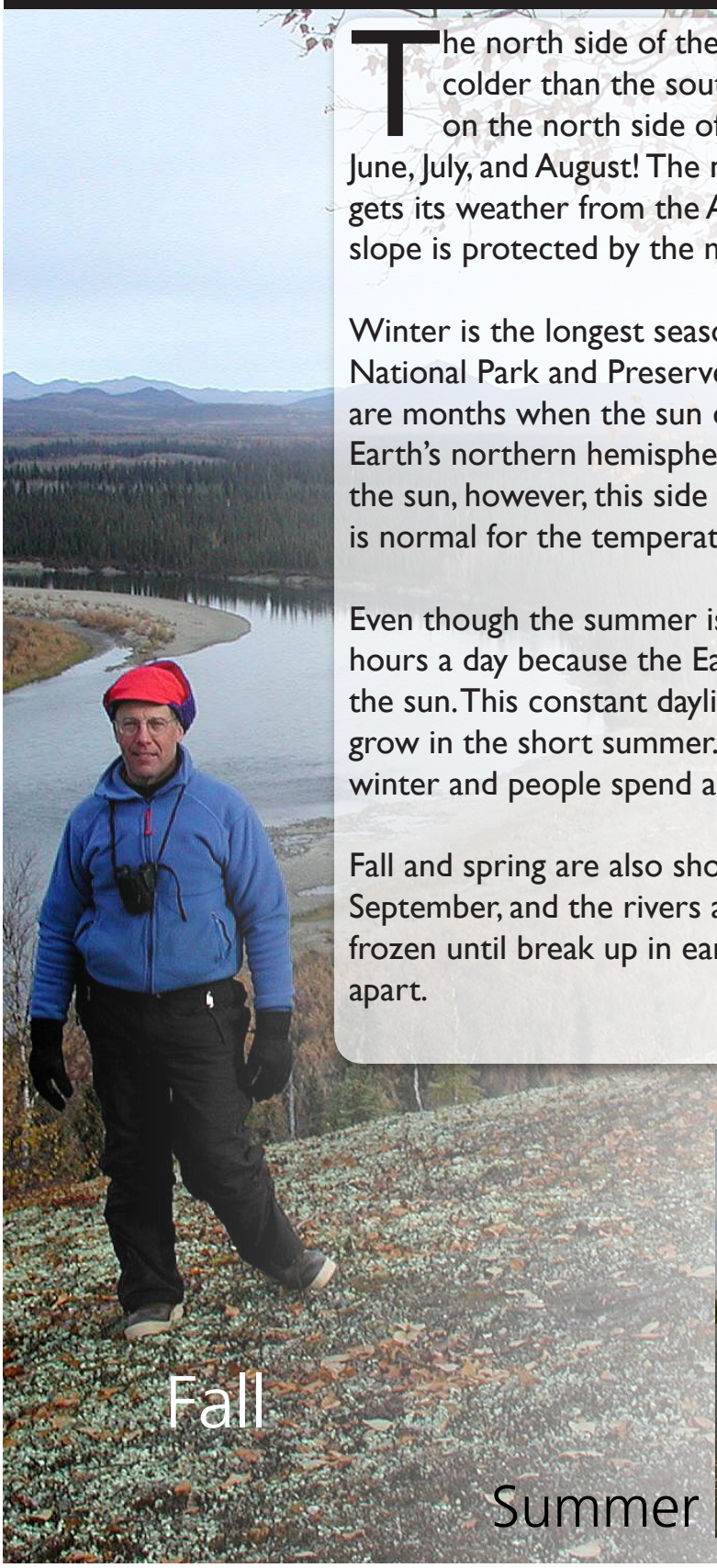
The north side of the Brooks Range is often colder than the south side. It can even snow on the north side of Gates of the Arctic in June, July, and August! The north side of the park gets its weather from the Arctic, while the south slope is protected by the mountains.

Winter

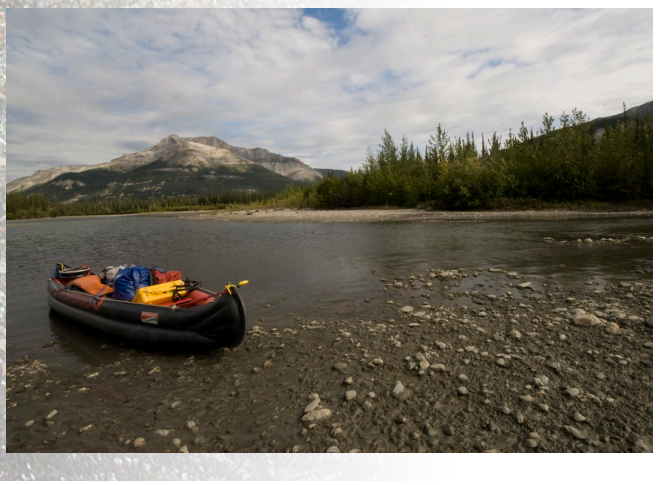
Winter is the longest season in Gates of the Arctic National Park and Preserve. In the northern parts of the Park, there are months when the sun doesn't rise above the horizon because the Earth's northern hemisphere is tilted away from the sun. Even without the sun, however, this side of the park still has five hours of twilight. It is normal for the temperature to fall to -40° F (-40° C).

Even though the summer is short, in June and July there is daylight 24 hours a day because the Earth's northern hemisphere is tilted toward the sun. This constant daylight gives the Arctic plants extra time to grow in the short summer. Animals run around getting ready for the winter and people spend as much time outside as they can.

Fall and spring are also short. Freezing temperatures start in September, and the rivers are frozen over by mid-October. They stay frozen until break up in early May, when the ice melts and breaks apart.



Fall



Summer

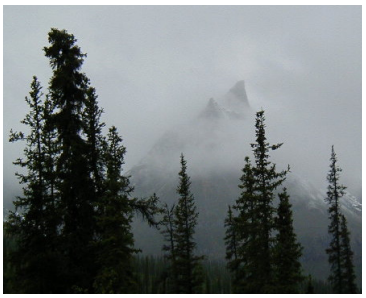
Carl Johnson Photo

# Ecosystems and Vegetation Communities

**Ecosystems** are the plants, animals and organisms that live in a specific environment. In Gates of the Arctic National Park and Preserve, ecosystems are impacted by the seasons and weather, permafrost and wildfires. The animals and plants that you find also change as you travel farther north and go higher up the mountains. There are three main types of vegetation communities in the Park and Preserve: tundra, boreal forest, and shrub thicket.

**Tundra** means "treeless plains." It is found at high elevations and on the north slope of the Brooks Range. From dry tundra on higher mountain slopes to boggy tundra in valley floors, the plants tend to be small and close to the ground. Many tundra plants are fragile and take a long time to recover if they are harmed.

Carl Johnson Photo

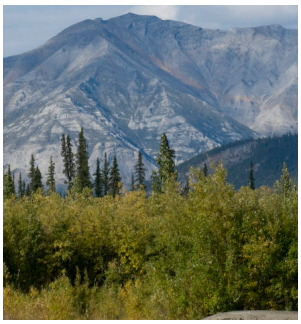


**Boreal Forest** is also known as **taiga**, which in Russian means "little sticks." It is common along the south slope of the Brooks Range between 600 and 2,100 feet in elevation. Taiga is made up of spruce, birch, and aspen trees. Bearberry, crowberry, Labrador tea, blueberry, and cranberry grow between the trees. Low-growing plants such as lichens and mosses and a variety of herbs cover the forest floor. The boreal forest is the largest intact forest in the world!

## *Wildfires: Challenge or Opportunity?*

Wildfires, usually caused by lightning, are an important and natural part of the ecosystem here. Fires clear old leaves and branches off the ground so that the sun can reach it, giving plants the chance to start fresh. The first plants to grow in a fire zone then give way to other plants, and the forest cycle is renewed.

**Shrub Thicket** is common along rivers and creeks, on the north slope and at higher elevations. The birch, willow and alder that crowd shrub thickets never grow to tree size. Shrub thickets typically occur up to 3,000 feet in elevation. They grow fast in areas that are newly uncovered after breakup and spring flooding. They were an important source of firewood for Native people in traditional times.



Carl Johnson Photo

☞A **vegetation community** is the plants that grow in a certain area, which depends on the kind of soil, the climate, and the weather.

# Animals of Gates of the Arctic

Carl Johnson Photo

Even though Gates of the Arctic might seem empty at first glance, there are 37 species of animals that live here. In an arctic environment most animals have to move around a big area to find enough food to survive, especially in the winter. Some are specially adapted to survive the arctic winters, while others migrate to warmer places for the winter. There are no known endangered wildlife species within the park and preserve.

## *The Lynx-Hare-Willow Cycle*

The lynx is a big cat found in Gates of the Arctic, and its favorite lunch is a snowshoe hare. The hares, in turn, feed on willow. Snowshoe hares change color in the summer and winter to hide from the lynx and other predators. Because hares have multiple litters during the summer months, the population grows rapidly. As the hare population grows over the years, the lynx also have more kittens. Eventually, the hare population will eat so much willow, the willows begin to produce a toxin, or poison, that makes it impossible for a hare to digest the willow. When this happens, the hare population will crash, followed by the lynx. When the willow recovers the cycle starts over.

Lynx

Snowshoe Hare

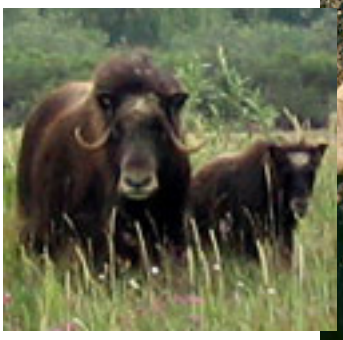
Willow

# Large Animals

Carl Johnson Photo

**Grizzly bears**, also called brown bears, spend the summer on a food search. Because their food is so spread out, there is an average of one grizzly bear for each 100 square miles. Grizzlies add layers of fat by eating anything they can find, including roots, berries, fish, carrion, and small mammals, and if they are lucky, the calves of moose and caribou. Bears spend the winter sleeping in their dens while their body burns the fat they stored in the summer for food. This is not a true hibernation, because they will occasionally wake up and move around in the den. The bear's heart rate slows, they don't eat or use the bathroom, and mother bears even give birth without fully waking up during the winter months!

**Dall's sheep** live in rocky peaks that protect them from most predators, except for humans, wolves, and eagles. Dall's sheep feed on alpine vegetation in summer. In the winter they search for slopes where the wind has blown the snow off the dried or frozen grasses and sedges. Approximately 10% of the world's population of Dall's sheep are found in Gates of the Arctic.



**Muskoxen** have only changed a little since the ice age and are very well adapted to living in the Arctic. They have two layers of hair to keep them warm: the long, outer guard hair is their raincoat and windbreaker, and the soft, thick under hair, called qiviut, is their warm sweater. They need both for the windy north slope winter. When attacked, the muskoxen herd will stand in a tight circle facing outward, not letting the wolves or other predators get through. This is effective against wolves, but not against humans with guns.

# Caribou

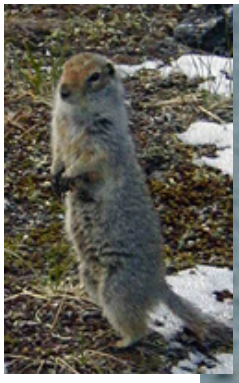
**Caribou** eat lichen, moss, grass, and other low-growing plants. Their hair is hollow, and holds heat well. Over half a million caribou migrate through the Central Brooks Range in three herds every year, moving to the north slope for summer and to the south side of the mountains, where the weather is less harsh, for winter. Caribou have special feet that spread apart, helping them to walk on snow and spongy tundra, and to swim. These feet click when they walk. Imagine the sound when they are migrating in huge herds!

Carl Johnson Photo

## *Mosquitoes*

**Mosquitoes** are found throughout Gates of the Arctic National Park and Preserve in the summer months. There are over 30 different species of mosquito in Alaska, but the good news is only the females suck blood (males eat only nectar). In Gates of the Arctic, people use bug jackets and pants, headnets, and mosquito repellent when travelling in the back country, which is an advantage over caribou: mosquitoes can take up to a pint of blood each day from a caribou!

# Smaller Critters



Carl Johnson Photo

**Arctic ground squirrels** are true hibernators, meaning that during the winter their heart rate slows, they don't eat or use the bathroom, and they sleep. Unlike other mammals, however, the body temperature of an arctic ground squirrel drops below freezing! Ground squirrels eat everything from seeds and roots to bird eggs and dead animals. This small animal is also an important food source for grizzly bears, which will dig away an entire hillside to get to the squirrel in its den.

**Alaska marmots** are herbivores; they only eat plants. They are social animals that live in rocky areas of the Brooks Range. When the colony "dens up" in the winter, they plug the den entrance with a mix of plants, mud and poop and none of the marmots can leave until spring when the plug thaws. Each family in the colony has its own den, and some dens are used over and over again for up to 20 years! Alaska marmots are true hibernators: they spend two thirds of their life in the den.

**Voles** are like small mice with short tails, and they are one of the most popular protein snacks for many park predators, including foxes, owls, hawks, gulls, and jaegers. Voles live in groups in grassy meadows, and one female can produce six litters of up to eight babies in a year. In the winter they make tunnels in the snow to feed on the grasses underneath; many predators are able to sense the vole's movements under the snow, or are able to smell them through the snow.

**Arctic foxes** change their coats twice a year. In the summer they have brown or grey fur, which blends in with the tundra and is cooler. In the fall they will shed the brown coat and grow a white one. This white coat has special air pockets in each hair, and is much warmer than the brown coat. It also makes it hard for the prey to see the fox when it's hunting on the snow. Foxes are **omnivorous**, and will eat small mammals, carrion, berries or eggs.

# Resident Birds of Gates of the Arctic

One hundred and forty-five species of birds have been identified in Gates of the Arctic National Park and Preserve. Some birds are resident birds, which means they stay here through the dark, cold winter. Most are migratory birds that come north for the 24 hours of daylight, then fly south for the winter.

## *Resident Birds*

Birds that remain in Gates of the Arctic for the winter face extreme cold, snow and ice. Many birds are less bothered by cold weather than mammals, because they don't have ears and tails to release heat, their downy feathers are very warm, and they have high body temperatures. Resident birds have a variety of other adaptations to the cold climate that allow them to survive in the arctic.

The **raven** is the largest songbird in the world, and makes more than 30 different sounds! They can be found anywhere and anytime in Alaska and play an important role in many Alaska Native cultures. In winter they fluff their feathers to stay warm, and their feet are bumpy to reduce the surface area that touches the snow or ice. Ravens eat whatever they find, including small mammals. Like owls, they throw up "pellets" of indigestible materials, such as bones.

**Black-capped chickadees** are often seen and are easy to recognize. They are small songbirds that live in the spruce forests. Their name comes from their call, which is "chicka-dee-dee-dee". To survive arctic winters they have thick feathers, and they put on fat quickly each day to use during the night. At night their body temperature drops, they may nest together and they have special muscles that shiver in order to stay warm.

Carl Johnson Photo

**Spruce grouse** live in the boreal forest. In the summer they eat seeds, berries and insects. They rely on their camouflage and allow people to approach very close. In the winter their intestines get bigger to support their diet of spruce needles.

# Migratory Birds


Arctic Tern

Carl Johnson Photo

Birds fly to Gates of the Arctic for the summer from all 50 states and all the continents. A bird you see around your house in the fall or spring might live in Alaska in the summer. They come to the arctic because of the food they can find and the great nesting locations. In the fall they fly back to where they came from with their young.

**Arctic terns** are water birds, similar to gulls. They are the migration champions: each year they fly 25,000 miles from the Antarctic to the Arctic, from the bottom of the Earth to the top of the Earth and back again, one of the longest migrations of any animal. Terns are fish-eaters, and can hover for short periods before diving onto prey.

The **Smith's longspur** is one of very few perching birds to nest in the Arctic. Perching birds have strong feet for grasping branches, and because they are most often found in forests, only a small number are adapted to tundra conditions. Studies on Smith's longspurs have just begun in Gates of the Arctic, and biologists are learning more about how many of these birds are in the park, when they're here, and where they nest.

The **yellow-billed loon** is a diving bird found in Gates of the Arctic. They spend most of their time on water and eat small fish. Loons can stay underwater for up to a minute and dive deeper than 200 feet. They use their feet to swim underwater, and their wings to steer. Loons prefer to dive, rather than to fly, when threatened.

The **golden eagle** is known to migrate from Central America to Alaska, although some will stay in Alaska through the winter. Their nests can be 10 feet (2 meters) wide and two feet (26 cm) deep, high in the rocky peaks of the Brooks Range. Golden eagles prey on rodents, birds and even young Dall's sheep.

☞Learn more about golden eagles in Alaska at http://www.nps.gov/akso/ParkWise/

# Plants of Gates of the Arctic

Because of the short but intense summer, Gates of the Arctic has hundreds of plant species that are well-adapted to the arctic environment. Here are descriptions of the main trees a visitor to the park is likely to find in the boreal forest areas on the south sides of the park. Trees in the arctic tend to be very small, but can be as old as the giant trees found in more temperate places.

**Black spruce** is one of the most common trees in the boreal forest. It can grow in cold, shallow, not very good soil, but the worse the soil is, the slower the trees grow. They are often small, with short branches and a clump of cones and branches at the top. Because of the challenging growing conditions, a hundred-year-old black spruce may only be 1 inch (2 cm) around! Black spruce can be used for many things, from chewing gum and medicine to bedding and firewood.

**White spruce** is the other main tree of the boreal forest. It is similar to black spruce, and used by humans in the same ways, but it has longer needles, pointier cones, grows taller and needs better soil. White spruce usually grows on south-facing slopes.

**Alaska Paper Birch** is another type of tree found in the boreal forest. Its light colored bark makes it look like aspen, but birch bark peels off in papery strips. It is one of the most useful plants for Native people. Its bark can be soaked and used to make many kinds of containers, and the wood, sap, and papery outer bark also have many uses.

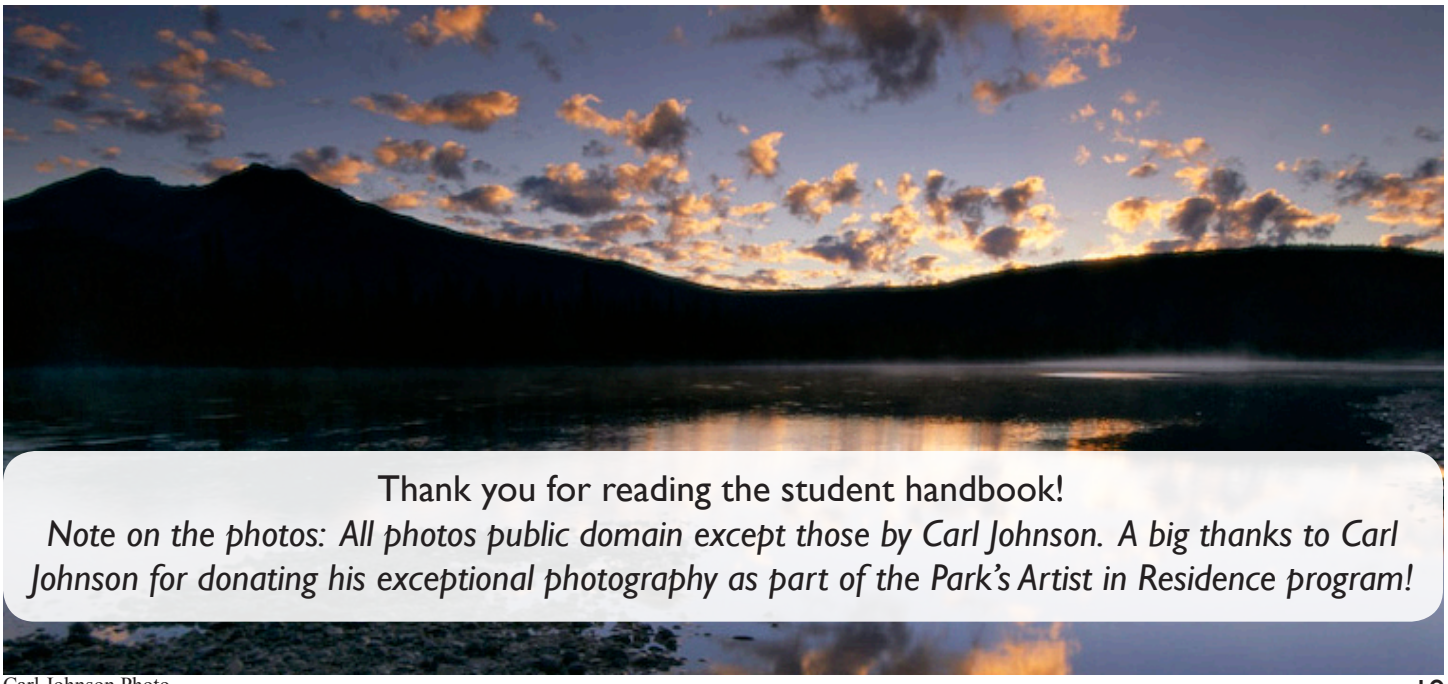
**Aspen** trees have flat leaves that rattle against each other with even a small breeze. For this reason they are sometimes called quaking aspen, or 'quakies'. Aspens have a white-ish bark with black knots and scars. They grow where there is water at least some of the year. Aspens have the ability to sprout more trees from their roots and are one of the first trees to grow back after a forest fire.

Aspens in the fall with white spruce in front.

# The Northern Lights

The Northern Lights, or the "aurora borealis" in Latin, can be seen in Gates of the Arctic National Park and Preserve when it is dark. They occur when particles charged by solar winds hit gases high up in the Earth's atmosphere. This collision gives off energy in the form of light. The Earth's magnetic field guides the charged particles to the north and south poles, which is why these lights occur in the very far north and south.

These light-causing collisions are always going on in the atmosphere, but like stars, they aren't bright enough to be seen during the daylight. Because it stays light all the time in the summer, the northern lights are only visible in the fall, winter, and spring.



Thank you for reading the student handbook!

*Note on the photos: All photos public domain except those by Carl Johnson. A big thanks to Carl Johnson for donating his exceptional photography as part of the Park's Artist in Residence program!*

Carl Johnson Photo