



Rock Creek TRAIL

An Environment of Competition

The boreal forest of Denali is a subarctic ecosystem consisting of a patchwork of coniferous and deciduous trees stands interspersed with lakes, wetlands, and tundra. Boreal forests support relatively few plant species, mainly white and black spruce and a small number of deciduous trees and shrubs. Boreal forests in Denali are underlain by discontinuous permafrost, inorganic soils that are frozen for all or most of the year. Explore the boreal forest and discover the competitive strategies that plants use to survive the short subarctic summer.

OPEN As you walk along the trail, pay attention to the forest canopy—the layer of forest formed by the tops of trees. Note if the canopy is open, where sunlight streams through to hit the forest floor; or closed, where the branches of the trees block the sunlight casting the forest floor into shadow. The presence or absence of sunlight determines what trees and plants can survive.

FAST Compared to evergreen needles, the leaves of deciduous plants have a large surface area to gather energy from the sun. This creates an advantage of speed for growth during the warm, sun-rich summer months or when a hole develops in the forest canopy. However, the autumn light triggers these leaves to fall to the forest floor where they are broken down by insects and bacteria and their nutrients recycled into soil for the next growing season. The advantage then goes to the evergreen trees, which continue photosynthesizing when temps allow.

Fire

Fire in the boreal forest plays an integral role in the reproduction of black spruce. The tree needs fire to open its cones. The seeds then fall to the forest floor. A wildfire occurred in this area in 1924, and many of the black spruce today are attributed to that event.



Alder

Alnus glutinosa
Deciduous

Leaves: Oval to broad. Finely double toothed.
4-8 cm long.

Bark: Smooth reddish brown.

Average Height: 3.2-10 ft (1-3 m).

Black Spruce

Picea mariana
Evergreen

Leaves: Short. 1-2 cm long, 4 sided

Bark: Scaly, dark brown to reddish.

Average Height: 20-30 ft (7-10 m).



YOURS Mine

Two distinctive classes of organisms have adapted to low-light conditions in the boreal forest understory by obtaining their energy without directly harvesting it from the sun—parasitic plants and saprophytic fungi. For example, unlike green plants that photosynthesize ground-cones obtain most of their nutrients from the roots of living alder shrubs.

DEFENSE Offense

Many of the plants in the boreal forest produce allelochemicals, toxins that adversely affect potential browsers. Willow produces a chemical that snowshoe hare cannot process, aspen leaves produce a chemical that deters porcupines, and spruce bark and needles contain terpene, which is difficult for most wildlife to digest.

DISPERSAL

Plants use a large amount of energy to reproduce. An effective seed dispersal agent can provide that extra advantage to survival. Plants such as fireweed use wind to carry their seeds, while other plants produce edible berries. Blueberries, crowberries, soapberries and low-bush cranberries mature when wildlife like bears are fattening up for winter and when birds are migrating south. For these plants, this means widespread dispersal combined with a nutrient-rich scat that will fertilize the seed as it grows.

Crowberry

Empetrum nigrum

Leaves: Needle-like, 3-8mm long.

Bark: Juicy berry-like drupes, edible.

Average Height: Up to 15cm tall.



Witches Broom

Spruce broom rust, a fungus, alternates between two hosts to complete its life cycle beginning on the leaves of common bearberry. Once the spores of the rust are released, they infect developing spruce needles. A hormonal response to the parasite causes the formation of witch's broom, a dense mass of shoots with discolored needles growing from a single point in the branches of the spruce. Occasionally witch's broom causes reduced growth or top-kill.



Bebb Willow

Salix bebbiana

Deciduous

Leaves: Elliptic to narrowly egg shaped. Smooth edged. 2-5 cm long.

Bark: Dull grayish to reddish brown.

Average Height: Up to 32 ft (10 m).



Denali Trails | Rock Creek Trail
Moderately strenuous
2.4 miles/3.8 km, 2 hrs one way
Please stay on trails.

This trail guide was produced in partnership by the National Park Service and the Alaska Geographic Association.

