

Web of Life Cheat Sheet

Northern Arctic Ecosystem	
ELEMENTS	LINKS AND FACTS
ABIOTIC	
Wind	<ul style="list-style-type: none"> • Winter winds are extremely forceful, creating blizzards and high wind chill factors. • Cotton grass seeds are carried long distances by the wind to replenish growth of vegetation.
Soil	<ul style="list-style-type: none"> • Arctic ground is characterized by low, rolling plains covered with soil and rock debris left by glaciers. • Limestone and sandstone debris is caused by frost. • Freezing and thawing of soil as a result of temperature changes contributes to mudslides. • Lichens in barren areas help create soil by injecting enzymes into cracks in rocks that help break down the rocks into smaller particles.
Sun	<ul style="list-style-type: none"> • Warmer temperatures create favourable conditions for species such as snow geese. • Winters pass in near darkness and extreme temperatures: -32°C. • Summers pass in constant daylight. The average temperature in summer is -10°C.
Water	<ul style="list-style-type: none"> • Moisture is plentiful – the melting of snow and ice, and the thawing of permafrost creates lakes, rivers, ponds and wetlands. • Very little annual rainfall.
BIOTIC	
Lichen	<ul style="list-style-type: none"> • A type of fungus that captures algae, forming a symbiotic relationship between the two species. • Absorb water quickly and efficiently from the air, allowing their algal partners to make food from the sun's energy. • A source of food for other creatures such as caribou. • Barren areas like the rocky land that exists after a glacier retreats will often be colonized first by lichen.
Fungi	<ul style="list-style-type: none"> • Feeds on trees and decomposes deadfall. • Consumes the food produced by the algae and wraps its fungal threads around the algae, acting as a house for it.
Algae	<ul style="list-style-type: none"> • Algae photosynthesize, making food from the sun's energy. Water is made available to the algae because of the fungi's ability to collect rain or moisture in the air.
Arctic Willow	<ul style="list-style-type: none"> • Low growth willow extends roots to gain moisture below permafrost level, often forming thickets along edges of streams and lakes. • Arctic willow roots easily, and is found growing along the ground out of the cold wind. • Inuit call it the tongue plant, because of the shape of its leaves. • Source of food for musk ox and caribou. Provides camouflage for Ptarmigan and low-lying birds.
Willow Ptarmigan	<ul style="list-style-type: none"> • Resident species of the arctic tundra. • Hides amongst rocks and willow bushes. • Brownish in colour, with dark stripes in summer, but completely white in winter allowing them to conceal themselves from predators while eating.
Cotton grass	<ul style="list-style-type: none"> • A type of sedge resembling coarse grass growing in wet marshy areas. The spring thaw releases moisture, which stimulates plant growth. • White tufts cover the fruiting heads in midsummer; these break off and are carried long distances on the wind. • Underground stem bases of cotton grass are a highly nutritious and digestible plant food for snow geese, musk ox and caribou.
Arctic Fox	<ul style="list-style-type: none"> • Burrows into the ground or snow for protection from the arctic cold. • Footpads are densely furred so that it can travel on the snow and ice. • Creates a store of food over the summer months and freezes it in the permafrost. • Almost entirely dependent on lemmings throughout the year.

	<ul style="list-style-type: none"> • Only 5 to 10% of the summer diet is composed of birds, eggs, ground squirrels, and berries • It is able to sleep in open snow in -80° C temperatures without its body heat dropping for an hour.
Collared Lemming	<ul style="list-style-type: none"> • Makes simple shallow burrows in summer - permafrost prevents them from digging deep for shelter. • Seasonal freezing and thawing creates ridges and depressions that lemmings use for burrows and as travel routes. • In winter, lemmings make large, globular nests of finely shredded grasses and sedges on the surface of the ground, which provide additional insulation when they are not out foraging. • Snow provides critical insulation. • Seeks out willows and cranberries as a source of food. • Key source of food for arctic wolves and arctic fox. • Populations shrink and swell depending on how many plants and berries are available.
Snow Geese	<ul style="list-style-type: none"> • Migrate in August/September from Canada after raising their young. • Seek out areas of wet tundra where there are few other plants besides cotton grass. • Feed up to 16 hours a day, consuming as much as one third of their body weight. • Increase their body fat by 400% in only two to three weeks feeding almost entirely on the lower stems and roots of cotton grass. • Nutrients from cotton grass will supply the geese with energy they need to fly non-stop more than 1,200 miles before they rest and feed again. • Wolves prey on snow geese during the summer migration.
Caribou	<ul style="list-style-type: none"> • Variations in snow melt patterns and the timing and location of plant growth on the calving grounds determine where the cows choose to have their calves each year. • Feed on cotton grass, willow brush and other low growth plants. • Insect and mosquito harassment interferes with caribou foraging, decreasing survival rates. • Ice resulting from rain in winter can prevent caribou from getting their food. • Wolves prey on caribou throughout the year, but most frequently in the winter. Bears prey on caribou during spring, summer and fall.
Mosquitoes	<ul style="list-style-type: none"> • Appear in early summer, just as the caribou are shedding their long winter hair. • Easily draw blood from the caribou at this time. • Caribou try to avoid mosquitoes using a variety of strategies – running, moving to higher, windier or drier ground, seeking out cooler temperatures or moving out into large lakes or shallow salt water; and/or bunching up into very dense groups. • The running, blood loss, and inability to spend time eating causes caribou to lose weight during a time of year when they need to be getting fat for the coming winter. Mosquitoes are therefore a major influence in the lives of caribou.
Musk ox	<ul style="list-style-type: none"> • Only large mammals that live year-round on the arctic plains. • Uniquely adapted to a frigid environment. • Long, skirt-like guard hairs and thick "qiviut" wool provide insulation, and square, short-legged bodies retain heat. • Less active in winter to conserve energy. • When threatened, musk oxen typically run together to form a tight circle or line. • In summer, musk oxen feed along rivers on a wide variety of plants. • In winter they move to areas with low snow cover to feed on sedges and shrubs.
Wolves	<ul style="list-style-type: none"> • Highly social animal, preferring to live in packs. • Hunting in packs, or groups enables them to kill large animals -- deer, elk, moose, caribou, bison, and musk ox. • Opportunistic feeders – will eat small rodents, birds, and ground squirrels. • Colour variation is a good example of natural selection, which enables those animals best suited to a particular environment to survive.
Ecosystem Processes	
Migration	<ul style="list-style-type: none"> • Weather conditions, such as the first severe storm in the fall, stimulate caribou to migrate toward their winter ranges. • The 24-hour days near the Arctic Circle produces a brief, but abundant, source of food during the summer. • Attracts many mammals such as the caribou to the Arctic for breeding purposes.
Symbiosis	<ul style="list-style-type: none"> • Lichen is a small simple organism that is a combination of an algae and a fungus.

	<ul style="list-style-type: none"> • Fungi break down nutrients that might be in the soil and uses them for food- in return the algae is able to photosynthesize, also creating food for the organism. • It is a mutually advantageous symbiotic association because both parts of the organism will benefit.
Predation	<ul style="list-style-type: none"> • Arctic fox preys on snow geese. • Arctic caribou herds travel north to avoid wolf predation. • Lemmings and other small mammals form a key food source for many predators. • Fluctuating populations cause some predators to adapt to lemming cycles by producing fewer or even no young, or by emigrating. The lemming population then recovers the following year.
Competition	<ul style="list-style-type: none"> • If a common resource is in short supply competition will occur between or amongst species. When lemming population decreases, arctic fox and arctic wolves will compete for the same food source. • Competition between musk oxen and caribou for food may affect population size of either species.
Adaptation	<ul style="list-style-type: none"> • Caribou are well equipped to survive in cold, snowy places. In winter, their hair is about three inches long and hollow inside, allowing them to trap air and keep warmth near their bodies. They also have four hoofed "toes" on each foot, when they are in snow, these "toes" spread out, acting like snow-shoes, which help the caribou walk on deep snow. • Some animals change themselves during the winter months, others hibernate and still others migrate to warmer regions. For example almost all the birds in the arctic tundra migrate south before winter starts while most mammals hibernate. • Animals such as the arctic fox cope with the winter by covering themselves in a dense layer of white fur. The fur covers every inch of their body including the bottoms of their paws. This layer of fur is so effective that the fox does not have to raise its body heat production till the ambient temperature reaches - 40° C.