

CYCLES OF LIFE IN THE NORTHERN FOREST

Forests cover more than 50% of the Northwest Territories land area. On a national scale, this represents 10% of Canada’s entire forest wealth. Like most of the Boreal Forest Region, our northern forests display a mosaic of plant communities reflecting differences in moisture, microclimate and soil, as well as in natural forces of change such as wind, flooding, insects, and disease. Fire and forest harvesting add to this mosaic by creating a patchwork of forests in various states of renewal.

Forest Stages

New Forests
New forests naturally regenerate in burned or harvested areas. Forest managers can help this process by planting or seeding after harvesting.

Immature Forests
Immature forests are generally the healthiest and fastest growing. Saplings and shrubs flourish, providing abundant food and habitat for many birds and mammals.

Mature Forests
Here forests range between 90 and 150 years old. Some tree species could grow older than this, but regular forest fires usually set this upper limit. Most of our oldest trees are found on the northern forest fringe where fires are less frequent.

Old Forests
As trees age, they become more susceptible to damage by insects, disease, wind and other natural forces of change. Fallen trees, branches and other litter build up on the forest floor, making stands more prone to intense fires.

Forces of Change

Forest Fires
Wander through any northern forest and you’ll likely see evidence of fire. Fire starts the growth of new forests and shapes their species composition and life cycle. Many birds and mammals depend on the mosaic of plant communities created by fire to meet all their habitat needs. Some trees, such as the jack pine and black spruce need the intense heat of wildfires to open their cones and release seeds. In short, the boreal forest is a fire-dependent ecosystem.

Flooding
Flooding is a powerful agent of forest change along our major rivers such as the Mackenzie, Liard, and Slave. The Mackenzie and Slave River deltas are particularly susceptible to this force, where annual spring floods scour their maze-like channels, felling countless trees each year. Some trees are drowned by rising floodwaters while others may be smothered by sediments released by fast-eroding banks.

Wind
Northern forest soils are often thin, poorly developed, and underlain by permafrost. Trees adapt to such conditions by growing shallow root systems, which makes them susceptible to being blown over by strong winds. Trees further weakened by insects or disease are especially vulnerable. Forest openings created by wind help bring life-giving sunshine to the forest floor, encouraging new growth.

Insects and Disease
Tree insects and diseases are most common in older forests. They help to rejuvenate the forest by culling old stands with low productivity and diversity. Insects are important in decomposing organic matter and releasing nutrients into the soil. Wide infestation by insects such as the spruce budworm can greatly increase a forest’s susceptibility to wind and forest fires.

Forest Harvesting
The biggest, most harvestable trees in the NWT are generally white spruce that grow in the rich valley bottoms paralleling our major rivers. Wood from these trees is mostly used for lumber. Trees in burned areas are used for firewood while trees in mature stands are used for lumber and other wood products.

THE TREELINE

If you go looking for the treeline, you may never find it. That’s because it isn’t a line at all but a wide zone of transition, between the boreal forest and the tundra, that can vary from just a few kilometres to 100 kilometres in width.



Crooked Wood & Flagged Trees

Beyond the treeline, trees can’t survive due to cold temperatures and frozen ground. In spite of these harsh conditions, spruce trees can survive at treeline by reproducing through layering, the process of sprouting stems from lower branches that touch the ground. The clumps of stunted trees that grow up from these stems are called krummholz, a German word meaning “crooked wood”. Most of these spend the arctic winter under a protective blanket of snow. Taller trees display small, gnarly branches along their trunks, usually on one side only. This “flagged” look is caused by buds growing on the windward side being killed by the abrasive effects of ice and snow travelling at speeds up to 120 kilometres an hour.

Forest Vanguards

Through layering, treeline spruce may have hung on for centuries. They likely represent relicts from warmer times when the forest extended farther north. As our arctic climate warms, these trees will be the vanguards of the future forest that marches out on to the tundra.



THE UNSEEN FOREST

A forest is a complex, constantly changing community of plants, animals, and other organisms, in which trees are only the most obvious members. Soil is the foundation for all life in the forest. Boreal forest soil is thin, nutrient-poor, cold, and slow to decompose. Even so, it is home to billions of insects and micro-organisms.



Fungi

Did you know the forest has Internet? Not exactly. But scientists are discovering that forests do have an underground communication network. Called mycorrhizae, it’s an interweaving of fungus and tree roots that helps both to get more nutrients, and allows the trees to exchange chemical “information”. One study found a network of mycorrhizae weaving its way through an entire Canadian forest, with each tree connected to dozens of its neighbours over distances of 30 metres.

Springtails

Northern forests owe a lot to the flea-like springtails, also known as snow fleas. Without them, all of the minerals and nutrients that plants need to grow would have been used up long ago, and you would be walking on a deep layer of dead and decaying plants and animals. Though barely visible, springtails play a key role in recycling nutrients and making soil, by grinding up dead vegetation and other organic material into minute particles. Springtails may be as tiny as pencil dots, but there are a lot of them. You can find hundreds to tens of thousands per square metre!



FOREST FIRST AID

Behind their bark and within their branches, northern trees hide a forest pharmacy fully stocked with natural remedies and cures that have sustained northern people for countless generations. Here are some simple tree-based treatments for common wounds, aches and pains. Of course, whether gathering natural foods or medicines, you should always follow the advice of experienced harvesters.

Condition	Commercial Remedy	Bush Remedy
Open wound	Sterile bandage	When steamed, paper birch outer bark separates into thin, annual layers of growth. Use these thin, flexible sheets to cover cuts or scrapes.
Wound or burn	Sterile dressing	The inner bark of pine, spruce and tamarack can all be harvested, boiled and worked to serve as a moist, healing poultice.
Bleeding or weeping wound	Astringent	Boiled alder bark yields a bitter tea, high in tannins, that can be used as wash for wounds to reduce blood flood and constrict damaged tissue.
Cut, rash or scrape	Antibacterial ointment	Sap from white and black spruce is versatile medicine – it can be mixed with fat or Vaseline to make a healing salve, or spread as is onto a wound to help reduce the risk of infection.
Chafing or blister	Talcum powder	Pass your hands over the trunk of a mature trembling aspen to gather a white, dry powder to apply to feet, thighs or wherever rubbing is likely to cause blisters.
Body pain or headache	Aspirin	Strip and boil bark from trembling aspen or willow, close shrub and tree relatives, and drink the tea as a pain reliever.
Broken bone or sprain	Splint	Bark from live trembling aspen or paper birch is flexible enough to be easily removed in the spring and early summer and yet rigid enough to be used to stabilize a sprain or fracture.
Sunburn	Sunscreen	To protect against over-exposure to the summer sun, dust your neck, face or any exposed skin with white trembling aspen bark powder.
Cough/sore throat	Throat lozenge	Gather young (purple) cones from the top of black spruce and use the resulting brew as a throat gargle.
Chest or sinus cold	Decongestant	Simmer perfumed balsam poplar leaf buds and inhale the steam to relieve nasal and chest congestion.
Insect sting	Anti-inflammatory	Green leaves of trembling aspen or willow can be chewed and smeared on stings or bites as a soothing poultice.



FOREST MANAGEMENT – PAST

Aboriginal people assumed the role of forest managers soon after they took up residence in the boreal forest thousands of years ago. Their primary tool was pyrotechnology – the intentional use and control of fire.

FOREST MANAGEMENT – PRESENT

People in the Northwest Territories still value and rely on forests for physical, economic, and spiritual well-being. The forest is a renewable resource, which needs careful management and protection so its many values and benefits will be available to future generations.

FOREST MANAGEMENT – FUTURE

Think of our forests as a two-sided coin – offering lots of natural wealth as well as economic opportunities. Protecting both forest values is the key goal of future management.

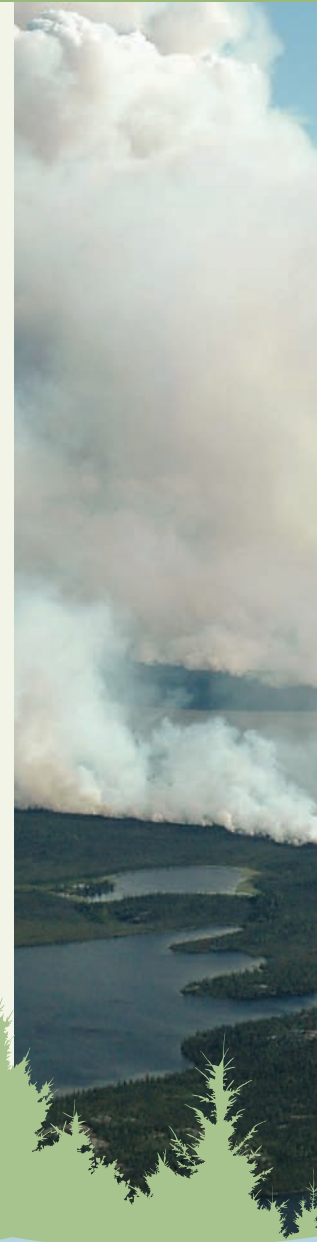
CLIMATE CHANGE



Stories of early visitors to the North tell how aboriginal people used fire to manage their forest home. They knew that a well-timed touch of fire to a grassy meadows or riverbank could help flush game animals or improve habitat conditions for wildlife such as moose and bison. When trapping became a way of life, they expanded their burning targets to improve habitats used by animals with the most prized pelts, such as beaver, fox and marten.

Besides giving a boost to wildlife, they also used fire to increase local supplies of, ironically, firewood! They knew that nothing prepares a spruce tree for this use better than a good hot forest fire, stripping it of bark and branches, leaving it easy to cut, easy to haul, clean to burn.

Another post-fire bonus well known to early natives was its purging effect on the forest's tangled undergrowth which could make travel impossible. Setting fire to a dense forest improved access to important hunting or fishing areas. Hunting parties often communicated to each other through smoke signals. They would also light smoke-rich smudge fires to keep down mosquitoes and black flies. Sometimes they deliberately torched old forests near their camps to reduce dangerous fuel loads and lower the risk of much larger, uninvited fires running them off the land.



Fire Management

Fire is the dominant natural disturbance in the boreal forest. You could say it's nature's version of sustainable management. It replaces older forests with younger, healthier trees. It renews the forest, and the habitats of all the animals and plants that rely on it. So it also renews the economic activities dependent on a healthy forest, such as trapping and hunting. The NWT Department of Environment and Natural Resources (ENR) combines traditional knowledge with modern fire science and technology to balance the forests' need for renewal with the protection of people, property, and economic values.

Forest Resources

For the last 60 years, forest management in the Northwest Territories was mostly concerned with commercial timber resources. Today, we recognize the value of a forest extends far beyond its ability to provide lumber, pulp, or even firewood. Carefully managed, the forest can provide a wealth of non-timber resources to support the health, well-being, and economic development of people in the Northwest Territories. With this in mind, ENR is adjusting its programs to address a full range of forest values, including non-timber forest products (NTFPs).

Northern forests are feeling the effects of more frequent and severe natural disturbances, such as wildfires and pests, combined with a changing climate. Innovative approaches will be important in the near future so forests stay healthy and continue to provide their many ecological and socio-economic benefits.



Vision of Tomorrow's Forest

What might a northern sustainable forest industry look like? It will provide diverse environmental, economic, social, and cultural opportunities for the benefit of present and future generations. The forest will increasingly be seen as offering many kinds of wealth – from conventional wood products and firewood, to non-timber forest products such as mushrooms, berries, and medicinal herbs.

The Dene and Métis people know a lot about many forest products and have harvested them sustainably for thousands of years. Tree-based teas, birch syrup, natural dyes, specialty wood and bark crafts, natural health remedies – these are all promising products that could be woven into a more diverse northern economy. Our future forest industry will draw more and more upon this kind of traditional knowledge to develop a greater variety of forest products for markets both near and far.

Rising prices for fossil fuels and the need to reduce greenhouse gas emissions prompted the GNWT to develop a Biomass Strategy that calls for a much expanded use of firewood and wood pellets. Though systems based on biomass fuels, like pellets, wood chips, or gasified wood waste, will vary among communities, tomorrow's forest industry will play an important role in meeting northerners' need for reliable, economical, and environmentally responsible sources of energy.



Harvesting the Potential of Non-Timber Forest Products (NTFPs)

- 500 types of NTFPs are commercially traded in Canada.
- Maple syrup, mushrooms and berries dominate Canada's NTFP industry.

- Markets exist for other products such as birch syrup, herbs, teas, seeds, resins, cosmetics, dyes, and decorative goods from the boreal forest.
- Estimates show that NTFPs could contribute millions of dollars to the NWT economy.
- Specialty mushrooms found in the boreal forest, such as pine mushrooms, chanterelles and morrels, can sell for over \$400 per kilogram.



As global temperatures continue to rise, our forests may change in several dramatic ways.

Fire's ancient balancing act between destroying the forest and rejuvenating it may be upset by warmer temperatures. If the climate changes as predicted, wildfires may become more frequent due to drier forests and a longer burning season.

The Northwest Territories has so far been spared devastating infestations of spruce budworms, sawflies, bark beetles and other insect pests. However a widespread defoliation of 2.5 million hectares of forest in 2002 may be a sign of future trends. Such outbreaks may spread north as temperatures rise and the season for insect attack gains time at both ends.

However the forests fall – by fire, insects or disease – in some situations, they may not recover. A changed climate could create conditions to which the original forest can't adapt. Forests better suited to these altered conditions may become established.



The specific effects of climate change on our forests will vary depending on many factors. One general effect that ecologists seem to agree on is that the treeline will move north.

These changes won't happen overnight. Even if the warming comes quickly, there may be a time lag of a hundred years or more before a new ecological order is established.

Northern residents and forest managers alike will face many challenges in adapting to the impacts of climate change on our forests. But many of these changes are not new. We have many creative tools at our disposal to help reduce and adapt to these impacts such as organic pest control, timber salvage programs, and biomass energy strategies.



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