Community Forests International

Into the Wabanaki

A Forest Care Guide • A Forest Care Guide • A Forest Care Guide

A guide for anyone who wants to connect and care for the forest. Follow the cycle of the seasons to learn more about the special Wabanaki Forest. Whether you're a forest caretaker, or just curious to learn more about the forest and the communities that call it home, the Forest Care Guide will help you connect and take the next steps on your forest journey.

Community Forests International

Community Forests International is a registered charity located in Sackville, New Brunswick with a mission to protect and restore Earth's climate by enabling communities and forests to thrive together.

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A Forest Care Guide

A guide for anyone who wants to connect and care for the forest

If you're reading this guidebook, you're likely eager to learn more about forests and the positive legacy you can leave on the land for future generations. Perhaps you have recently purchased or inherited forestland and want to learn more about your management options, or maybe you have had a woodlot for many years and enjoy exploring, fishing, or hunting on the land. However you arrived here and wherever you are on your journey, this guidebook will invite you to listen, observe, and connect in different ways with the land you call home.

Dive deeper and learn more:


Reflection


Activities


Fun Facts


Terms


Resources

Underlined resources can be found online by visiting: forestsinternational.org/forestcareguide

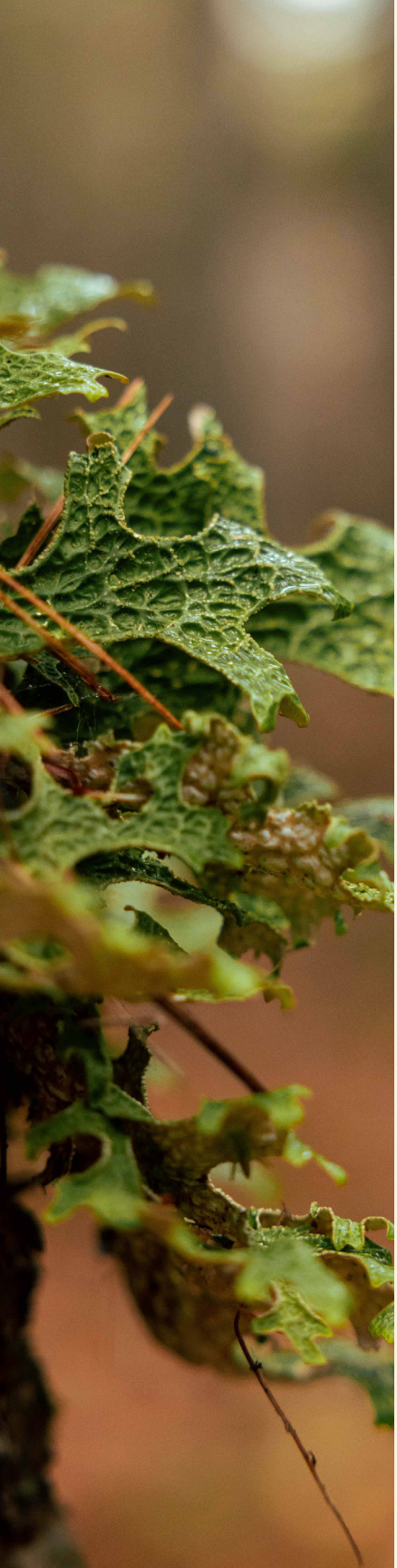
Welcome

Picture this. It's summertime in the forest. You close your eyes and breathe in the cool fresh air. There is a soft but lively chorus of bird songs, leaves rustling in the wind, and water trickling across wet rocks. You open your eyes and watch as the dappled sunlight dances across the mossy ground. Forests are intricate ecosystems brimming with life, and there's so much we can learn from and within them.

Like the land, this guidebook follows the four seasons. Each chapter includes information about the flora and fauna with which you share the forest, the influence of natural disturbances and climate change, and actions you can take to have a positive impact on the landscape. Like an ecosystem, this guide is a collection of the big and small: it considers the landscape, watershed, and the distinct stands in your forest as well as the soil, plants, and animals.

You can explore topics like wildlife habitat; the role of water in forest ecosystems; planting climate-resilient tree species; forest complexity; Indigenous rights and perspectives; the risk of extreme weather events; and the role that forest owners like you can play in protecting and restoring the natural infrastructure on which we all depend. At the end of each chapter, you'll be invited to reflect on your relationship with your forest and how you might apply what you have learned.

To start, we invite you to pause for a moment. What are your long-term goals for your forest? How do you see yourself contributing to the health and well-being of your land? What legacy do you hope to leave for future generations through your stewardship of the forest?



The Wabanaki Forest

The lands you care for are part of a unique forest ecosystem. The Wabanaki Forest—also known as the Acadian forest—roughly spans Wabanaki'k, which encompasses the Gaspé Peninsula of Quebec, New Brunswick, Nova Scotia, Prince Edward Island, and parts of New England.

This forest type is an eco-region transition zone or "**ecotone**," boasting a unique diversity of tree species from both the boreal forest, to the north, and the hardwood forest, to the south.

Ecotone: An ecotone is a transition area where two ecological communities meet and integrate.

Indigenous people have shaped and cared for the Wabanaki Forest since time immemorial. The Wabanaki Forest is part of the traditional unceded territories of the Mi'kmaq, Wolastoqiyik, Peskotomuhkati, Penawapskewi, and Abenaki nations. These lands span the northeastern coast of Turtle Island, including in what is today known as Canada. Together these five First Nations form the Wabanaki Confederacy, which means the "People of the Dawn." Members of the Wabanaki Confederacy signed a series of Peace and Friendship Treaties with European settlers. Each of us has the responsibility and honour of upholding the intentions of these agreements. **We are all Treaty Peoples.**

The Wabanaki Confederacy spans what is today known as the Maritime provinces of Canada.
Cartographer: Stacy Morin

A Note on Language

Using Indigenous place names is one way in which Indigenous peoples are reclaiming the land. We choose to use the Indigenous place names for the wider region in an effort to honour the land and the Indigenous Nations who have called it home since time immemorial. That is why this guidebook will primarily use the following names for this region and land.

» Wabanaki Forest — Acadian Forest
» Wabanaki'k — Maritime Provinces of Eastern Canada
» Turtle Island — Canada

These names and terms are not direct translations or interchangeable. For example, both Turtle Island and the Wabanaki'k region span beyond these post-colonial boundaries. And while this guide provides more detailed information for communities living in one of the three Maritime provinces of Canada, much of the information provided will be relevant to anyone caring for forested land across Turtle Island.

A Forest at Risk

The Wabanaki Forest is remarkable for its natural ecosystem complexity, and its high diversity of plants, trees, animals, insects, and more. But this also leaves the Wabanaki Forest vulnerable to changes in the climate because some of its tree species are at their range limits—meaning they are growing as far north or south as they can tolerate. Climate change is occurring much faster than the natural migration of trees, which means that trees are not able to move to areas with more suitable growing conditions on their own.

Today's forest is more vulnerable to change than ever before. We have lost a lot of the species diversity since colonization, and many of this region's forests also suffer from severe degradation because of historic and ongoing intensive forest management practices. There is little forest left in pre-colonial condition, and the amount of forest older than 100 years is estimated to be only 1–5% of the forest cover. Today's forest has shifted towards predominantly young, even-aged, and **early successional** characteristics. What's more, there is an over-representation of boreal species, like balsam fir and white spruce, across the landscape—the same boreal species that will not fare well in a changing climate. While other tree species like red oak and white pine will do better, most scientists think that there is a significant risk of overall forest loss in the region as these more robust species will be slow to replace the losses of more vulnerable tree species.

Early successional species: Early successional species (often called pioneer species) are the plants that grow in an area shortly after a significant disturbance, such as fire or clearcutting. Early successional tree species in this region include white and grey birch, poplar, white spruce and tamarack.

In addition to its effects on the growing conditions for trees, climate change is disrupting forests in other ways. For example, we're witnessing an increase in invasive non-native species, drought stress, and extreme weather events—all of which affect our forests. Forests under stress and forests that lack diversity can also act as a net source of carbon emissions. This is because they are more vulnerable to climate-related disturbances that can cause them to degrade even more rapidly.

A history of degradation and the increasing impacts of climate change are posing significant risks to the livelihoods of family forest owners in the region, as well as to the vigour of the forests that support them. While transitioning to alternative forestry methods that improve your forests' resilience to climate impacts is essential for the well-being of the Wabanaki Forest and our communities, many forest caretakers face multiple obstacles in doing so. If you've found this challenging, you're not alone.

In a different but parallel struggle, the Wolastoqiyik ("Wool-las-two-wi-ig"), Peskotomuhkati ("Pes-koh-too-muh-kah-tee"), and Mi'kmaq ("Meeg-mah") communities that have cared for the Wabanaki Forest for time immemorial face even greater barriers to practising forest livelihoods due to severely limited access to their ancestral forestlands. Forest degradation and climate change are

also affecting the diversity of life in forests, which is negatively impacting Indigenous peoples' ability to practice deep traditions that are connected to that diversity.

A Hopeful Future

Forests remain vital to mitigating the effects of climate change. By encouraging greater tree species diversity and promoting species that are likely to grow well under climate change, you can help your forest become more resilient and even thrive in a changing climate. The first step is to know what's growing in your forest, and that's exactly where we'll start in this guidebook. Whether you have the privilege of caring for a thriving old forest with a rich understory, a forest regenerating after decades of agriculture or forestry, or a small property with a few unique trees, by paying close attention throughout the seasons, you will find that you have something to cherish.

To build a sustainable and just future, it's crucial that we learn from the past and work together to care for the forest and all those who rely on it.

"The biggest thing I can see for landowners to help in response to climate change is to know their forest. If we don't know something is happening, we can't address it. So, knowing your land, knowing what you have and how it's changing is really important." – Dr. Kara Constanza, forest pathologist

We hope this care guide will inspire you to engage with the forest in ways that benefit the land, the plant and animal life you share it with, and the generations that will come after you. So, take it into the woods, get it dirty, mark it up. The forest is our shared guide, and this book is your invitation to follow it.

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Spring

Spring

By March or April, the snow that blankets the forest starts to melt beneath the warm sunlight. Life comes into bloom: trees release their buds, leaves come out, and spring wildflowers blossom —sometimes for just a few days at a time. Migrating animals return to their summer homes, and hibernating animals start to emerge with their young. Spring is a special time in your forest, and this chapter will help you connect with water systems, cherish the life you find, and encourage regeneration in your forest.

Ephemerals

We begin this season with our eyes on the forest floor, where a wonderful tapestry of wildflowers, ferns, moss, and lichens re-emerge in the spring. One of the greatest gifts of this season is flowering spring ephemeral plants. Ephemeral means “short-lived” or “lasting for a brief period.” Spring ephemerals enjoy a vital part of their life cycle—the reproductive portion—during a short period in the early spring. As the earth is damp with melted snow and trees begin to break their leaf buds, these plants take advantage of the open canopy above them and the longer days of the warm spring sun to grow their flowers before the tree leaves emerge. Spring ephemerals show some of the first signs of life in the forest. While these plants are slow to establish and are very sensitive to their environment, when in the presence of a stable, healthy forest, they often carpet the floor, creating a colourful tapestry between the trees.

Flower – Mi’kmaq: *Wasueg*; Wolastoqey: *Pesqahsuwesk*

Spring ephemerals require specific environmental conditions, like soil type, temperature, and pollinators. These spring ephemerals provide the very earliest sources of pollen and nectar to hungry pollinators, who have just emerged after the winter—a unique and strongly interdependent relationship. Some ephemeral species close their flowers at night, protecting their most vulnerable parts from the inevitable frosts, and re-open in the morning with the rising sun. Having evolved to depend on the first hint of warmth in the year, these plants take a risk by emerging in a changing season, and their resilience to lingering snowfalls and frosty nights show us the power of natural adaptation.

There is a simple joy that comes from getting to know your forest and the plants and animals that make it unique. Each successful plant or tree identification builds on this relationship and teaches us something as we strive to care for the forests and its inhabitants.

We’d love to know what you find! Tag **@community_forests** in your forest photos for a chance to get featured on our Instagram.

Trout lily *(Erythronium americanum)*

The trout lily is named after its resemblance to the trout fish, with mottled brown spots along its long slender leaves. Often found in moist, rich forests like tolerant hardwoods and the low, rich plains next to watercourses. You are lucky to witness these flowers, as only 0.5% of a colony will flower per year, on average. It takes up to 7 years for a newly established trout lily to produce a flower.

Canada mayflower *(Maianthemum canadense)*
Mi'kmaq: *Sko'q'tpikusuiwasuekji'*

This flower has many common names—Canada mayflower, false lily-of-the-valley, and two-leaved Solomon's seal are just a few. In early spring, a solitary flower stalk can be seen hosting one to two dozen small, delicate white flowers and their small leaves often carpet the ground in coniferous and mixed-wood forests or clearings. This plant is well adapted to both moist and sandy soils.

Trilliums (*Trillium spp.*)
Mi'kmaq: *Wkwamulamunipkek*

The most common trilliums in Wabanaki'k are the red/purple trillium (*Trillium erectum*) and painted trillium (*Trillium undulatum*). These are some of the larger spring ephemerals and are easily identified by their three petals and three leaves arranged in a star shape. Red trilliums tend to be larger plants, with beautiful dark red flowers, whereas painted trillium (pictured here) have white flowers with delicate red slashes radiating out from the centre.

Pink Lady's Slipper *(Cypripedium acaule)*
Wolastoqey: *Wiphulakson*

Also known as Moccasin Flower, this hardy and long-lived orchid is easily recognizable by its large pink flower, which is shaped like a moccasin. These flowers generally flower between May and July and tolerate a range of habitats, but grow best when undisturbed. Pink lady's slippers have a fascinating relationship with fungi; until they develop their root system, the flowers rely on fungi for nutrients. Once the flower is grown and can feed itself, its roots reciprocate and provide fungi with nutrients.

An Eye to the Sky

Have you ever been out in the woods and taken a moment to listen to the sounds around you? What do you hear? If you are lucky, you might hear some little chirps and peeps. Small songbirds are often curious about who is in the woods with them and will let you catch a glimpse into their world. All you need to do is slow down and listen.

These birds you hear provide many important benefits to the forest, including pollinating plants, dispersing seeds, and helping to control insects. Unfortunately, many of these birds are also at risk. According to a 2019 study by the National Audubon Society, over two-thirds of North American bird species are at risk of extinction.

Check out **episode 6 of the Below the Canopy podcast** with professor and forest biodiversity researcher Matt Betts to hear more about the link between birds and the health of the Wabanaki Forest.

The good news is that many risks to birds are within our control to change. According to Birds Canada, three of the five major threats to birds are habitat loss, pesticides and contaminants, and the climate crisis. As a forest owner, you can support bird species by maintaining forest cover, promoting diversity, and encouraging forest regrowth after harvesting.

Bird – Mi'kmaq: *Jipji'j*; Wolastoqey: *Sips*

Another way to support bird habitat is by leaving deadwood as standing trees or logs on the forest floor. As soon as trees start to decline in health, insect and fungi colonies move in and create a great source of food for birds. Brush piles and cavities in larger trees also provide places for birds to roost and nest.

The nesting season for migratory birds in Wabanaki'k is generally mid-April to late August, but nesting calendars can provide more details on the migratory patterns of specific species. Restricting disruptive forest operations during this time increases the survival chances for young birds. This is especially important if you have identified uncommon or rare birds in your forest or surrounding areas.

A few of our favourite apps for identifying flora and fauna in the forest are **iNaturalist** (for plants) and **Merlin** or **eBird Canada** (for birds). Plus, using these apps also contributes to citizen-led science!

Many of us tend to clear decomposing or dead woody debris from our forestlands. But keeping it is actually more beneficial to the ecosystem! A forest replenishes its soils and retains moisture through the decomposition of fallen trees, branches, leaves, and needles. Many birds use the still-standing or partially fallen dead trees for nesting cavities, drumming logs, and foraging. Maintaining old, dead, and dying trees in your forest is one of the easiest ways to promote diversity in bird life and the general long-term health of the forest.

"Standing dead trees with a fairly large diameter, at least 8–10 inches, can provide valuable habitat for wildlife as they begin to decay. If your woodlot doesn't have much large standing deadwood, then this can be an effective way to encourage wildlife on your property." — Jamie Simpson, author of *Restoring the Acadian Forest*

Downy Woodpecker *(Dryobates pubescens)*
Mi'kmaq: *apo'qatej*
Wolastoqey: *pakahqaha*

If you're planning a harvest, you can request that your forest management practitioner leave large old trees and existing standing deadwood (also called snags) during harvest activities. Resisting the urge to "clean up" large portions of the forest beyond the area immediately surrounding buildings and infrastructure can have many co-benefits for carbon storage, tree regeneration, water retention, soil organic matter, and wildlife.

Water: Forest Flows

Spring is an ideal time to observe how water flows through the forest and learn its role in your forest landscape. If you have a stream, creek, or swampy area on your property, spend time getting to know it. These areas are rich with biodiversity and vitally important for the ecology and workings of the forest—cherish them!

Water – Mi'kmaq: *samqwan*; Wolastoqey: *samaqan*

During the later parts of spring, as the snow melts, you can often walk through your forest and see where water gathers, where it collects in rivulets, and where it flows to meet streams and rivers. A map is a good place to start your journey, as knowing the range and topography of your surrounding area can help you place your forest within the watershed. With a little exploration, this big picture will help you understand the relationships between water systems and wildlife habitats, vegetation types, and any water quality considerations you might have with your forest.

Watershed: A watershed is an area of land that captures and channels rainfall and snowmelt to waterways lower down, such as a stream or lake. Watersheds can be identified by tracing around all of the highest points on a topographic map.

Looking for maps? There are province-specific mapping software full of great information like property lines, topography, and watershed information. We've listed a few at the end of this guide!

Let's dig into the science for a minute. The density of the forest canopy and the variety of the vegetation around watercourses have a direct relationship with water quality. The forest canopy also affects the pace of snow melting; the denser the canopy, the less sunlight and rainfall enter, which means that in areas where the forest remains mostly intact, snow melts gradually and flows steadily into watercourses. This means that the watercourses downstream from your forest are greatly influenced by the health and quality of the forest on your property.

The slopes and soils next to the watercourse also vary in their sensitivity to nearby changes. Soils with finer textures like silt and clay are more prone to rutting and compaction, whereas sandy or rocky soils are more resilient. Riparian areas—the areas next to and including watercourses—are highly sensitive to disruption and play crucial roles in a forest ecosystem. They offer travel routes for wildlife, regulate water flow, and are frequently home to rare plant species.

"Forests keep waterbodies cool for fish, filter out pollutants, prevent erosion, mitigate flooding, and provide critical habitat. In turn, waterbodies provide moist shoreline growing environments and rich soils, as well as water and food sources for wildlife. Protecting forest vegetation, including trees, leaf litter, undisturbed soil, and large woody material around waterbodies is critical for maintaining healthy ecosystems." — Kate Turner, Nashwaak Watershed Association

It's also important to take note of the communities—both human and non-human—that are within and downstream of your forest. Remember, your choices and activities within the forest will directly impact them.

Vernal pools are seasonal pools of water that provide important biodiverse habitats.

Wetlands

There are many different types of wetlands, some with standing water and some without. Forested wetlands are, to no surprise, wetlands with trees, often distinguishable by the species of trees, plants, and mosses that grow there. Some common forest wetland species are Eastern white cedar, black spruce, sphagnum moss, and cinnamon fern. Forest wetlands are important for the overall ecosystem, providing habitat for a diversity of flora and fauna and helping to filter and regulate water flow.

One of the most visible types of wetlands in spring are vernal pools, which are seasonal pools of water that form in shallow depressions on the forest floor. These temporary pools are important breeding sites for frogs and salamanders. Emerging from the ground in the earliest days of spring, these creatures find their way to nearby vernal pools to mate. Because they dry up as summer approaches, vernal pools are generally free of predators, making them a safe(r) home for hatchlings.

Purple pitcher plant, or *lapskatk* (Mi'kmaq) and *Matiskwok* (Wolastoqey), grows in bogs and fens across Wabanaki'k.

Areas of a forest covered by sphagnum moss indicate water-logged ground and are often the first sign that you may be moving toward other wetlands like fens, bogs, swamps, and marshes. Unlike vernal pools, ponds and open-water wetlands are often permanent. While their vegetation and water levels may change throughout the year, you will be able to observe these forested wetlands year-round. These wetlands are sensitive ecosystems, and it's important to know where they are located for management purposes.

Go for a 'water walk' and try to answer some of the questions below. Take some time to slow down and observe how water moves across the landscape, and don't forget to use your phone or a paper map to note any areas of interest or concern.

- What types of water features (brooks, vernal pools, forested wetlands, etc.) are present within the forest?
- If you have roads in your forest that cross waterways or sensitive areas, is there evidence of soil erosion or siltation in streams?
- If any heavy forest operations have been conducted in your forest, is there evidence like rutting and compaction?

It's essential to be mindful of how your forest management decisions affect the water. Poorly planned water crossings can have ripple effects in the forest by altering a water channel's width, location, and flow. For example, this can waterlog or even flood an area in the forest, in turn impacting the surrounding vegetation and wildlife and causing increased erosion of nearby soils. It can also make it more difficult and expensive to undertake a well-considered harvest in the future. If you suspect that past management has impacted the integrity of a stream or wetland in your forest, you can consult your local watershed association. There is likely a group in your region that works with private forest caretakers to protect and restore waterways.

In addition, your province or area will have specific regulations governing watercourses and the activities permitted around them. For example, most provinces require a "riparian buffer" to protect these delicate areas. It is always best to ensure you understand your legal and ethical responsibilities and seek advice from a professional who can advise you on the impacts and regulations that apply to your land. Your local watershed group will have resources on this as well!

Did you know? Beavers (or *gopit* in Mi'kmaq, *qapit* in Wolastoqey) are forest managers too! They often build dams in or around the original channel of a forested stream, which produce upstream wetlands. These beaver-built wetlands can be extensive, help filter water, and act as a catchment area for sedimentation. Beavers will frequently set up camp next to adjacent clear-cuts because fast-growing hardwood species offer a ready supply of food.

If beavers start to affect or damage culverts and roads, consider building and maintaining beaver puzzles to help prevent permanent damage—this will often encourage the beavers to quickly move on to another location without the need for harming them.

Reforestation

Spring weather provides the ideal conditions for tree planting. In April and May, the soil is moist, and the cool days protect seedlings from drying out. Although reforestation occurs naturally, there are times when you might consider planting trees to kickstart the process. Perhaps there are areas on your property that were recently harvested, sustained damage through a natural disturbance, or were cleared for agriculture. Or perhaps there are areas of your forest that were previously single-species plantations or were otherwise heavily managed and are lacking the full range of tree species that would naturally occur in the area. Before you grab a shovel, there are a few questions you should ask yourself.

Should I plant?

A healthy forest should regenerate itself, but as you know, many forests in our region have lost the full diversity required for self-renewal. Especially in the face of a rapidly changing climate, our forests sometimes need help to regain their ability to regenerate fully on their own. Thoughtful tree planting can ensure your forest's diversity is restored. (Conversely, poorly planned planting can cause decades of corrective silviculture and increased costs, so make sure to plan any tree planting efforts carefully!)

What to plant?

Just like in a garden, different tree species like particular types of soil and sunlight conditions. Consider the conditions in your forest and choose trees that are well-suited to your forest's microclimate. You can also choose species by first identifying which species in your area are thriving or by looking to introduce native species well-suited to the area. Pro tip: You should also choose trees that are predicted to do well in our changing climate, thereby positioning your forest to keep thriving well into the future.

Where to plant?

There are a few areas where tree planting can be especially helpful. These include areas where less-desirable tree species are competing for resources with tree species you would like to promote, areas where natural regeneration is lacking, and areas of high disturbance—such as areas that have been cleared or have experienced windthrow that will take a longer time to seed naturally.

When to plant?

Planting trees in cooler, rainier months inspring and fall is best. Avoid planting mid-summer or if conditions have been or will be hot and dry. When planting make sure the roots of the seedlings are in soil, not loose needles or woody debris (duff), and ideally in a slightly higher mound or edge rather than where water will sit.

Getting trees

Depending on how many trees you want to plant, you can start your own seedlings from seeds you collect or carefully relocate young seedlings from other areas of your forest. Using locally-sourced trees that are best suited for your particular forest gives you the best chance for success. If you want a larger number of trees, check with your local wood marketing board, forestry co-op, or local greenhouse, as they often take bulk orders for flats of seedlings. And remember, handle seedlings with care!

Looking to source seedlings? There is often provincial funding available to support forest management activities, including tree planting. You can check out your province's Woodlot Owners Association for information to help determine if you are eligible for support, and help you access further resources and advice. And of course don't forget to check in with your local nurseries for seedlings!

Spring Reflection

This spring, you trod carefully, paying close attention to the forest floor, and learned about the unique role of spring ephemerals. You tuned your ear to the ever-changing chorus of bird songs in the woods and observed the role of water. You'll continue to hone these observation skills in the next season, when the days are long, the sunshine is warm, and the forest is in full bloom. Before then, take a few minutes to reflect on what you learned and experienced this spring!

What new plant or animal species did you discover in the forest this spring?

What do you enjoy most about the springtime changes in the forest?

What did the forest teach you about regrowth or renewal?

Summer

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Summer

In the warm summer months, the forest offers a cool respite from the heat. Trees release their buds and grow rapidly, taking advantage of the long, sunny days. The full tree canopy shades the forest, providing cool temperatures that are especially important for young animals. Although some watercourses will dry up in periods of drought, forests do an exceptional job of holding moisture in the ecosystem, like sponges. The forest is lush and lively in the summer—it's an ideal time to observe how the forest works as an ecosystem. Get outside, explore the forest, and find a shady spot to cool down. While you're there, take a moment to touch the earth. Beneath all the beauty of the forest lies a critical element: soil.

Soil: The Forest's Foundation

Soil is the foundation of any healthy forest ecosystem, and understanding its properties is essential for effective forest management. Let's dig in.

Soils are incredibly diverse, varying in acidity, moisture content, and nutrient levels. In the Wabanaki Forest, you'll find four primary soil textures: sand, silt, clay, and loam. Each tree species has specific soil requirements, and understanding these can help you identify what trees might be growing in your forest.

A natural climate soil-ution. Did you know that as much as 44% of forest carbon is stored in the soil? What's more, research shows that more diverse forests hold more carbon in their soils—enhancing their climate and community benefits!

For example, black spruce, tamarack, and black ash tolerate acidic soils, while sugar maple, yellow birch, and red oak require fertile soils that are moist but well-drained. By understanding the soil requirements or constraints of the most common tree species in the region, you can create a forest care and management plan that supports their growth. Later in this chapter, you will learn the soil requirements for some of the most common tree species in this region. Knowing trees' soil requirements will help you understand what tree species can and might be growing in your forest.

On your next forest walk, you can look out for indicator species to tell you a little about your forest. For example, the presence of sheep laurel *(Kalmia angustifolia)* in a forest can suggest the soil is nutrient-poor and may not support the growth of more nutrient-demanding trees, like sugar maple.

It's worth noting that soils in areas with a history of forestry or agriculture may have been disturbed or altered. To ensure a healthy forest ecosystem, rebuilding soil fertility is critical. One simple way to do this is by increasing the amount of dead trees and woody debris that is left on the forest floor. To grow a healthy future forest ecosystem, one of the most important things you can do is rebuild soil fertility.

The **Nova Scotia Forest Ecosystem Classification** and other similar resources can be used to help you understand your forest and the soils beneath it.

Now that we've dug into the soil, let's turn our gaze upwards to another basic but essential element for a healthy forest: sunlight.

Light in the Forest

As you know, all trees require three essential ingredients to grow and thrive: nutrients, water, and sunlight. The availability of those ingredients on a particular microsite will largely determine which species will grow and how well. We've talked about water and soil, now it's time to explore the third key ingredient: sunlight. Summer is an ideal season to really spend time understanding how sunlight impacts patterns of forest development, tree species composition, and growth, and how you can influence these patterns to enhance the natural forest ecosystem.

The health of forests can be influenced by adjusting the amount of sunlight that reaches different layers of vegetation all the way to the forest floor. This means that we can actively manage forests to achieve specific goals, such as increasing timber production, creating wildlife habitat, or boosting carbon storage. One way to achieve this is by selectively removing trees in various patterns and intensities, which can help favour certain species and improve the complexity of the **forest structure**.

Forest structure: Forest structure encompasses the horizontal and vertical distribution of layers in a forest including the trees, shrubs, and ground cover—both living and dead. This also includes the variability of the forest floor such as the undulating 'pit and mound' topography which indicates a forest that has not been cleared for agriculture in the past.

By removing certain trees or clearing small patches, we can increase the amount of sunlight available for seedlings and young trees, encouraging their growth and development. For instance, if you are interested in enhancing the climate resilience of your forest, you might identify desirable climate-resilient species growing in the understory, such as young sugar maples or red oaks, and carefully consider removing some of the larger trees that are less resilient, like balsam fir or white spruce, to allow more light to reach these seedlings.

Sun – Mi'kmaq: *na'gu'set*; Wolastoqey: *kisuhs*

It is worth noting that different tree species require varying amounts of sunlight to thrive and mature. Light is such a crucial factor that you will often come across references to shade tolerance when reading about the unique characteristics of different tree species. Shade tolerance is defined as a tree's ability to persist in the shade without dying. Shade-tolerant species can bide their time for decades, waiting for a gap to appear in the canopy above, giving them the chance to grow upward into the upper forest layer.

Shade Tolerance of Common Wabanaki Forest Trees

High shade tolerance:
Red spruce, eastern hemlock, balsam fir, American beech, sugar maple, striped maple, and eastern white cedar.

Moderate shade tolerance:
Black spruce, red maple, white pine, yellow birch, red oak, and white spruce.

Low shade tolerance:
Red pine, jack pine, white birch, tamarack, grey birch, and trembling aspen (poplar).

Forest Structure

Now that the canopy is full, it's a great time to start looking at your forest more closely. Forests are composed of different **forest stands** which can range from a few trees to larger areas covering several acres or hectares. Stands are simply a way to organize forests into units or distinct areas, allowing for a focused analysis of tree populations and ecological dynamics.

Forest stands: Forest stand is a wide-ranging term relating to a particular section of forest. Generally, trees in a stand share some similar characteristics, such as similar vegetative communities. But, they might also be classified based on stewardship goals, intervention history, soils, wildlife or habitat considerations, or physical barriers like roads and streams.

Upon careful examination, you can see that the forest is generally made up of three main layers of vegetation. The lowest layer is where seedlings and smaller plants grow (the herb layer), followed by a layer of shrubs and regenerating trees (the shrub layer), and finally the uppermost layer made up of trees, sometimes in varying stages of maturity. This tree layer can be **even-aged** or **uneven-aged**.

Even-aged forests: In even-aged forests, are where the majority of trees are of similar age and size, typically resulting from a previous stand-replacing disturbance such as clear-cutting or wildfire. **Uneven-aged forests**, on the other hand, comprise trees of various ages and sizes, often resulting from natural regeneration or selective cutting.

In the Wabanaki Forest, wind is the biggest natural disturbance, which creates small gaps or patches in the forest. This type of natural disturbance is known as a "gap disturbance regime." Over time, this produces a complex mix of different-sized and different-aged trees and shrubs, resulting in a more diverse forest.

In the Wabanaki Forest, many stands naturally regenerate over long periods of time in an uneven-aged structure, which promotes the growth of shade-tolerant, long-lived species. However, some forests have been forced into an even-aged structure by past management practices. By understanding these different forest structures and how they develop, we can make informed decisions about how to manage our forests for specific goals, such as timber production, wildlife habitat, or carbon storage.

Get into the forest for a sunny woods walk and consider some of the questions below. First, try to see past the individual trees and observe the forest structure. Spend some time gazing up into the canopy, and then work your way down through the different layers to the forest floor.

- How many distinct stands can you identify? What makes them different?
- Are there parts of your forest that are more even-aged than uneven-aged?
- What species are present in the three different vertical layers of your forests (canopy, tree/shrub, and seedling/plant)?

Complexity and Resilience

Forest complexity is a significant driver of biodiversity—the variety of species and habitats in the forest. A complex forest has a range of plant and animal species, many different ages of trees, and various layers of vegetation, both living and dead. Topographical features like ravines, pits, mounds, and wetlands can also contribute to a forest's complexity.

In addition to driving biodiversity, complexity is also an essential factor in a forest's resilience to disturbance. A more complex forest stand can better withstand threats such as climate stress, pests, fire, or windstorms. This is because a single disturbance event is less likely to affect a large area of trees in a complex stand, compared to a simplified stand. For example, pests tend to affect only one tree species, and a forest with a variety of tree species is more resistant to their damage.

A forest with greater age, species, and habitat diversity is more resilient to change than one with less diversity.

When a disturbance affects a significant proportion of trees in a stand, it can have a profound impact on the forest's ability to support other values such as water regulation, habitat, connectivity, and carbon storage. Remember, your choices don't happen in isolation. If a number of forest caretakers all harvest over a short time span, it can have broad implications for ecosystem health and resilience on a large scale. Similarly, if you and other individual forest caretakers decide to manage your forests for increased biodiversity, the entire ecosystem benefits and becomes more resilient to change.

Promoting composition and structural complexity is critical to reducing the vulnerability of a forest to climate change and natural disturbances. By prioritising complexity in forest management, caretakers can help protect and enhance the biodiversity, resilience, and overall health of their forests and the greater Wabanaki ecosystem.

Trees of the Wabanaki

Now that you understand forest structure, it's time to talk trees! Within the Wabanaki Forest, there are actually several distinct types of forests. Trees require specific soil characteristics, moisture levels, and climatic conditions to grow. The variation in environmental conditions across the region means that the tree species you will find along the coast of Mi'kma'ki, Nova Scotia, may be very different from those you will find in a New Brunswick floodplain.

Discovering what tree species grow in your forest is one of the first things you should do when you begin spending time in the woods. It will help you understand if your forest is at risk of disturbances such as wind storms or invasive insects and influence the kind of forest management activities you can undertake in the forest you care for.

There are at least 32 tree species in the Wabanaki Forest, and this guidebook will help you identify some of the most common.

There are two main types of trees: coniferous and deciduous. Coniferous trees have cones and keep their needles all year round. Deciduous trees lose their leaves during the winter. Coniferous trees are also commonly referred to as "softwood" trees, while deciduous trees are often called "hardwood" trees. However, there is one exception to this rule in the Wabanaki Forest: the tamarack or larch tree, *apu'tam'kie'jit* in Mi'kmaq and *pqomus* in Wolastoqey, which is both cone-bearing and loses its needles during the winter!

Red Spruce *(Picea rubens)*
Mi'kmaq: *Gawatgw*
Wolastoqey: *Olonatoq*

Red spruce is rarely found outside of the Wabanaki Forest. Red spruce trees grow in conifer and mixed forests. They are shade-tolerant and can grow in a variety of soils, though they prefer moist but well-drained soils. Red spruce trees have short, green needles that have a hint of yellow and grow all the way around the twig. The branches of young red spruce tend to drape downwards, and they have small cones compared to other spruce species.

White Spruce *(Picea glauca)*
Mi'kmaq: *Gawatgw*
Wolastoqey: *Supatoq*

White spruce trees are abundant throughout the Wabanaki Forest region today. They tolerate harsh environments, such as ocean coasts. As an early successional species, they are also commonly found in old agricultural fields. They prefer moderately to well-drained soils, where they typically grow alongside white birch and trembling aspen. White spruce can be distinguished from other spruce by their blueish-green needles. Give them a sniff test—you'll find they have a pungent smell!

Balsam Fir *(Abies balsamea)*
Mi'kmaq: *Stoqonaqsi*
Wolastoqey: *Stahqon*

Balsam fir is also abundant across the region today as a result of common forestry practices, which are favourable to this conifer species. Balsam fir is highly shade-tolerant and can grow in almost any soil type. They have aromatic, flat green needles that grow spirally but rotate upwards onto a single plane. Their bark contains obvious blisters that are full of sticky resin. Balsam fir are commonly used as Christmas trees.

Sugar Maple *(Acer saccharum)*
Mi'kmaq: *Snawei*
Wolastoqey: *Memsi-sonaw*

Sugar maple is a shade-tolerant and long-lived species. They require a lot of nutrients to grow and are usually found in sites with rich and well-drained soils. The leaves of sugar maple trees have five lobes and u-shaped margins, and they turn orange, yellow, or red in the fall. In the winter, you can identify sugar maple trees by their bark, which is furrowed with deep cracks. Closely observed, their buds look like short pyramids.

Red Maple *(Acer rubrum)*
Mi'kmaq: *Malsnawei*
Wolastoqey: *Sonaw*

Red maple is abundant across Eastern North America. They are more tolerant of wet soils than sugar maple and can be found in a variety of habitats, including swampy areas, flood plains, and dry soils. However, red maple trees are most common in areas with moist, well-drained, and moderately fertile soils. In contrast with sugar maple leaves, which have u-shaped margins, those of red maples have sharp v-shaped margins. Red maples can easily be identified in the fall by their red leaves and stems.

Yellow Birch *(Betula alleghaniensis)*
Mi'kmaq: *Mnnoqon*
Wolastoqey: *Mosson*

Yellow birch is a long-lived and moderately shade-tolerant hardwood species that grow in moderately drained, moist, and fertile soils. You can easily identify yellow birch by its golden bark, which shreds into small pieces. In contrast, white birch bark comes off in sheets. Yellow birch twigs have a distinctive wintergreen flavour.

Eastern White Pine *(Pinus strobus)*
Mi'kmaq: *Guow*
Wolastoqey: *Kuwes*

White pine is the tallest tree in the Wabanaki Forest and one of its longest-lived species. White pine can grow in a variety of conditions but does best in well-drained, moist, and sandy soils in riparian zones. They have tall, straight trunks and long, feathery needles. When inspecting white pine branches, look for bundles of five needles, as the needles on red pine and jack pine come in pairs.

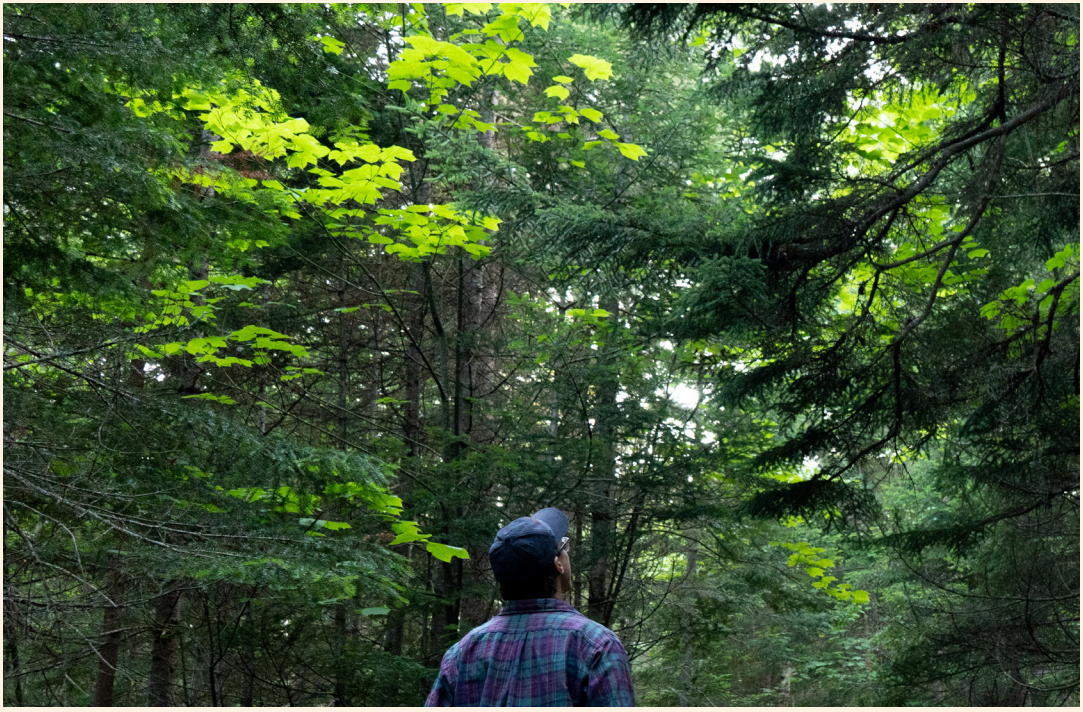
Eastern Hemlock *(Tsuga canadensis)*
Mi'kmaq: *Gsu'sgw*
Wolastoqey: *Ksiwsk*

Hemlock is also one of the longest-lived species in the Wabanaki Forest, with a lifespan of 300 to 500 years. Hemlock likes cool, north-facing slopes and often grows along water edges. Hemlock needles are short and occupy a single plane, like balsam fir needles, but they have a small peg where they attach to the twig. Hemlock branches are delicate, like lace.

American Beech *(Fagus grandifolia)*
Mi'kmaq: *Suomusi*
Wolastoqey: *Mihihqimus*

American beech requires moderately fertile and well-drained soil. They have a high shade tolerance and often grow alongside red maple, sugar maple, yellow birch, red spruce, and hemlock. The oval leaves of beech trees turn golden in the fall and hang on through the winter. Beech trees have smooth bark but can develop cankers when affected by beech bark disease.

Tree ID time!
Take a 10- or 15-minute walk in your forest. How many different tree species can you identify? What tree species are most abundant?



A Note on Language

Indigenous worldviews and knowledge of lands and waters have evolved over thousands of years and offer important perspectives and approaches to addressing the climate and biodiversity crises. You'll have noticed the Wolastoqey and Mi'kmaq names for the trees in the previous section, and we encourage you to learn and practise using local names for the many trees, animals, and plant life. These languages developed in relationship with the Wabanaki Forest and can offer unique insights. You never know what you might learn from their names!

There is an ongoing movement to save the Wolastoqey language that needs your solidarity and support. Created by Mi'kmaw filmmaker Desmond Simon, the short film **Kehkimin | Teach Me** showcases the new Wolastoqey Language Immersion School and includes links for you to learn more and donate to support the efforts to save this endangered language.

Summer Reflection

The warm summer months are passing, and you'll soon be rewarded with crisp temperatures, changing colours, and fewer bugs! You had a busy summer learning about the structure of a forest, and you identified the various stands and tree species in your woods. You also investigated the forest floor and practised identifying different soil types and the species that thrive in each one. In the coming months, you'll build on all of the knowledge you've acquired and learn how you can connect with the people and groups who can help you apply your knowledge through ecological forest management.

What was your most memorable summertime experience in the forest?

Are there areas in your forest that have a special emotional or spiritual importance to you?

What were one or more new things you learned about your forest this summer?

Fall

Fall

As leaves change colour and trees go dormant, birds begin migrating to their winter habitats and hibernating animals prepare for the winter ahead. The fall season is traditionally a time of slowing down for gratitude and reflection. In this chapter, you are invited to learn more about the history of Indigenous and settler relationships, to practice gratitude for the fall harvests while learning how to practice responsible harvesting, take a look at how wind patterns impact and change your forest, connect with community, and to reflect on how colonization continues to impact the forest and the Indigenous peoples who live on this land—and how you can be part of a hopeful future.

A Living History

In the 18th century, the British Crown entered into **Peace and Friendship Treaties** with the Mi'kmaq, Wolastoqiyik, and Peskotomuhkati First Nations. These treaties recognized Aboriginal title and established the rules for what was meant to be a respectful relationship between equal nations. However, the Crown and Government of Canada have continuously violated these agreements, including by transferring millions of hectares of shared forestland to individuals and corporations, which resulted in the forced removal of Indigenous peoples from their ancestral lands.

Peace and Friendship Treaties: These treaties are a series of agreements signed between the British Crown and several Indigenous nations in the 18th century. They outlined promises, mutual obligations, and benefits for both the Crown and the Indigenous nations, including the recognition of Indigenous sovereignty over their lands and resources.

As a result, First Nations were stripped of their traditional livelihoods and practices, and access to their lands became severely limited. These policies continue to affect Indigenous communities and the well-being of the Wabanaki Forest today. For generational and new settlers on Turtle Island, it's important to understand the significance of the treaties and ongoing policies and to work towards upholding the values of mutual respect and partnership between Indigenous and non-Indigenous peoples.

As a forest caretaker, here are some steps that you can take:

1. **Explore the past:** Learn about the Wabanaki Peoples' diverse histories, cultures, and traditions related to the Wabanaki Forest, as well as the specific treaty agreements and court decisions that recognize and protect their land rights.

2. **Be present:** Unfortunately, misleading information has made some people feel threatened and fearful of what Indigenous land rights could mean for their own land. It is important to understand these land claims do not target individual citizens, but rather focus on provincial and industrial actors who have failed to honour the treaties. Across Turtle Island, including in Wabanaki'k, Indigenous communities are upholding their rights and responsibilities to the land, and are asking for your solidarity.

3. **Build a hopeful future:** Engage with local Indigenous peoples, communities, and organizations to build relationships based on mutual respect and trust. Listen to and learn from Indigenous perspectives on land, resource use, and forest stewardship.

By working together and with a renewed commitment to upholding the values of the Peace and Friendship Treaties, we can create a more sustainable and just future for all. For example, respectfully integrating traditional knowledge and perspectives into your own fall foraging and hunting practices can help ensure your and others' future harvests.

Harvesting and Hunting

Fall harvest is a time of abundance for farmers, hunters, foragers, and forest creatures alike. We invite you to take this time to reflect on how to make use of and enjoy this abundance in a way that honours the land and future generations. In Mi'kmaq culture, this concept is known as **netukulimk** (pronounced: "stneh-doo-goo-limgp"), and is an understanding that communities can achieve well-being that does not jeopardize the integrity, diversity, or productivity of our environment.

Netukulimk is the use of the natural resources provided by the Creator, and guides individual and collective beliefs and behaviours in resource protection, procurement, and management to ensure sustainability and prosperity for future generations. – L'nuey, The Concepts of Netukulimk and Two-Eyed Seeing

If you're excited to take advantage of the abundance during this season, fantastic! Let's make sure we do it in a way that is respectful and responsible.

First and foremost, be sure to respect conservation measures and regulations. Stay up-to-date on catch limits, closed areas, and seasons to ensure that you're not harming the ecosystem or overexploiting resources. A key part of practicing netukulimk is having an innate awareness of one's impact on the environment and life forms, which allows for harvesting, hunting, and fishing to occur in a responsible way.

When it comes to hunting and fishing, each province has its own regulations and requirements, including specific dates when people are allowed to hunt certain species. Check your local hunting regulations for seasons and know what restrictions might impact hunting on your land, like legal distances to dwellings and schools or active forestry operations. Make sure to understand your local context and regulations before going out or allowing others to use your property.

One simple but essential sustainable foraging practice is to only harvest what you need. This means being mindful of what you're taking and how you're taking it, and making sure that you don't take more than the ecosystem can support. For example, when out foraging, only take what you can use or preserve, and never harvest all of a specific plant, mushrooms, or other organisms from a specific area. This allows these organisms to regenerate and continue to persist and hopefully thrive into the future.

For a more comprehensive and holistic perspective, read Robin Wall Kimmerer's article on the Honourable Harvest, or pick up a copy of her book, Braiding Sweetgrass.

In "Npisun | Medicine," Water Grandmother Cecelia Brooks and her son Anthony share their knowledge and perspectives on harvesting medicines, accessing traditional lands, and a hopeful story from one settler about how his ancestors lived on the land.

Be aware: Fall is hunting season. Always wear fluorescent orange or other brightly coloured clothing when you head into the forest—for you, your family, and any animal companions.

Wind: A Force for Change

With its proximity to the Atlantic Ocean, wind has a significant influence in the region. Indeed, windthrow is the primary method for natural forest disturbance and regeneration in the Wabanaki Forest: when a tree falls in the forest, more light becomes available for young trees to flourish. Although wind has a natural role in the forest, factors like forest health, intensive forest management, and more severe climate change-related weather events have and will continue to amplify this effect.

Wind – Mi'kmaq: *Ugju'sn*; Wolastoqey: *Wocawson*

Certain tree species are generally more susceptible to wind damage than others. Shallow-rooted tree species—such as spruce, balsam fir, trembling aspen, and red maple—are typically more at risk in wind storms than trees with deep root systems like oak. Shallow-rooting also frequently occurs in wet areas; thus, wet areas may be more susceptible to wind damage than areas with well-drained soils. Yet another factor is tree size. Bigger trees with their impressive canopies can also get caught by the wind more easily. Windstorms that occur before the leaves have fallen can be especially damaging, since full canopies can catch the wind and increase the likelihood of trees falling.

Changes caused by natural disturbances like hurricanes can take time to process and put into context, as they can affect your sense of safety, place, and permanence. But it is important to remember that wind damage can also have a positive impact on forest ecosystems. For example, biodiversity can be improved by creating fallen and standing woody debris, which provides crucial wildlife habitat.

One way to mitigate wind damage on your property is by leaving forested buffers on your boundary lines and at the edges of any areas in which you are undertaking silviculture interventions. A buffer can prevent the risk of wind tunnel effects in mature stands. These types of actions often require good communication and coordination with your neighbours. Generally, increasing the diversity of tree species in your forest through appropriate management will help mitigate the future impacts of extreme weather events.

Has your forest been impacted by a severe windstorm? Don't panic. Getting accurate information about the damage and potential options should be your first step. Developed after Hurricane Fiona in 2022, the FAQs for forest caretakers can help you plan your next steps.

Learning with Others

Connecting with other forest caretakers is an ideal way to learn about different forest management approaches, and fall is the best time to get out to local events and connect with other forest stewards in your area.

This season is a great time to connect with other people and organizations connected to forests. There are several groups that support private forest management in Wabanaki'k, and they tend to fall into a few distinct groups. Some organizations offer forest management services—such as management planning, silviculture, and harvesting—while others focus on conservation and are knowledgeable about water quality, endangered species, and climate change. Several Indigenous-led organizations also offer resources and events for the general public, such as the Confederacy of Mainland Mi'kmaq. Many of these groups have Facebook pages and email newsletters, which are great ways to learn about their projects, services, and any upcoming events.

Wondering what groups operate in your area? You can browse by service type on the Maritime Forest Accord website or skip ahead to the "Forest Service Providers" list at the end of the guidebook for a list of organizations and their offerings.

Reconciliation: For Settlers

September 30th marks the National Day for Truth and Reconciliation in Canada, a day to honour and remember the experiences of Indigenous peoples and communities impacted by residential schools. Whether your family has lived on Turtle Island for several generations, you are a first-generation Canadian, or you are a newcomer to the country, we all play an important role in the journey toward Indigenous reconciliation.

> "What we're asking and requiring of non-Indigenous people is to think more openly and broadly about their perspective on land ownership, the history of stewardship and roles and responsibilities towards land."— shalan joudry, Mi'kmaw ecologist and narrative artist

You started this chapter by recognizing the complex colonial history of the country and how it has impacted Indigenous peoples and the land. Now you are invited to take time to learn more about historical and ongoing injustices —and reflect on how you can contribute to healing relationships with the land and each other. Here are three resources for exploring Indigenous perspectives. By taking the time to learn and reflect, you can find ways to contribute to reconciliation in your own way.

Three things to do on National Day for Truth and Reconciliation:

1. Watch the short film Windhorse: A Land Back Story.
2. Read "Whose Land Is It Anyway? A Manual For Decolonization" by Peter McFarlane and Nicole Schabus.
3. Explore the Ally Toolkit created by the Wolastoqey Nation in New Brunswick.

Looking for more active ways to practice land-based reconciliation? Consider contacting local Indigenous-led organizations and First Nations communities to offer your forest for traditional harvesting practices. Many communities are looking for sources of important medicines like eastern white cedar *(Thuja occidentalis)* — called *qasgusi'* in Mi'kmaq, and *kakskus* in Wolastoqey.

Fall Reflection

As the last of the leaves fall to the ground, you'll be thinking about the upcoming winter months and what final preparations you need to make. Before we get there, take a minute to think back. This season, you may have practiced responsible foraging and hunting, learned more about how wind patterns impact the forest, and reflected on how to recognize and uphold the rights of Indigenous peoples who have been stewards of these lands for millennia. Above all, you followed the cues of the season to start slowing down and looking inward while continuing to act with the well-being of the wider community in mind. In the next season, you'll find some ideas and resources for continuing to grow and deepen your connections to the forest and to your local (and wider) community.

In what ways do you honour the Peace and Friendship Treaties?

If you connected with other landowners this fall, did you meet anyone who has helped shape or contribute to your understanding of the forest?

What is your hope for the next 100 years in the Wabanaki Forest?

winter

- Impacts of a Changing Climate
- Shifting Baselines
- Being a Good Neighbour
- Climate-Focused Stewardship
- Working with a Forest Professional
- Working with a Harvesting Contractor
- Reflection

Winter

By November, the daylight hours slip away. The days are short and crisp. As temperatures dip, the ground freezes, and trees enter a resting phase until spring. It's a time to cherish the evergreens in the forest, which provide cover and habitat to birds and other animals in the winter months. Migrating animals move south, while hibernating mammals disappear into their dens. The winter months are a time of rest for the forest, animals, and plants. This is your invitation to take the time to slow down, reflect, learn, and plan—all while enjoying the beautiful quiet of a winter forest!

Impacts of a Changing Climate

Even during the winter months, it's important to be aware of how a shifting climate is impacting the forest ecosystem.

Snow – Mi'kmaq: *Wastew*; Wolastoqey: *Wastesok*

Shifting Winter Temperatures: Warmer winters, as a result of climate change, can disrupt the natural rhythms of the forest. Some tree species rely on a period of sustained cold temperatures to properly prepare for dormancy and ensure healthy growth in the following seasons. With milder winters, these species may experience delayed or inadequate dormancy, affecting their overall health and resilience.

Changes in Snowfall Patterns: Snow plays a crucial role in protecting the forest floor and tree roots from extremely cold temperatures, acting as an insulating blanket. Insufficient or inconsistent snow cover can expose trees to harsh frost and freeze-thaw cycles, increasing the risk of frost damage, root injury, and even tree mortality.

Increased Risk of Winter Drought: Climate change can also contribute to drier conditions during the winter months. Reduced snowfall and lower soil moisture levels can lead to winter drought stress for trees. Inadequate moisture availability can impact their ability to photosynthesize and access necessary nutrients, weakening their overall vitality and making them more susceptible to pests, diseases, and other stresses.

Unpredictable Freeze-Thaw Cycles: The trees in this forest rely on the predictable winter freeze and the subsequent spring thaw as part of their natural life cycle. However, this once-reliable pattern has become less stable, causing concern for some tree species. When spring arrives, bringing warmth and renewed life, these plants should burst forth with growth for the season. Certain species, like the balsam fir at the southern edge of their habitat, are facing challenges in surviving through multiple years of these changing conditions.

Altered Species Interactions: Warmer winters may allow certain pests, such as bark beetles or non-native insect species, to survive in regions where they were once limited by colder temperatures.

Through the traditional craft of basket making, The Borer & The Basket outlines the spiritual, ecological, and cultural practices at risk from the spread of the emerald ash borer, an invasive species threatening the ash trees of the Wabanaki Forest. In weaving personal stories with the latest research, the film follows the basket makers and experts trying to preserve the forest before it's too late.

As a forest caretaker, it's important for you to be aware of these potential impacts and adapt your practices accordingly. By staying informed and implementing appropriate strategies, you can mitigate the effects of climate change on your forests and foster long-term ecological resilience.

Shifting Baselines

The Wabanaki Forest we see today is very different from what it once was. Because so much of the land has previously been worked for agriculture or forestry, sometimes what is currently growing doesn't reflect what species would have been present historically. For example, a sunny slope that was once sugar maple might have been cut frequently for firewood and is now predominantly balsam fir and red maple. Yet for many of us, we look around and simply see the forest as we've always known it.

This **shifting baseline** means that each new generation sees the current state of the forest as the natural state of the forest, even if it has undergone significant changes over time due to human activities such as logging and climate change.

Shifting baseline: A shifting baseline refers to the phenomenon where the perception of what is considered "natural" or "normal" changes over time as a result of generational amnesia and lost understanding of past ecological conditions.

This can result in an underestimation of the extent of ecological change and a lack of awareness of the need for restoration and conservation efforts to address these changes. Remember that balsam fir and red maple stand? With some careful stewardship, sugar maple could slowly return to that stand.

"If [you] want to get in there and do some hands-on work in your forest, it all sort of depends on what you have there in the forest. If you know that that land could, or once did, support more of a diverse forest, then thinking about ways to get seed trees back onto that land can be a very valid thing to do."— Jamie Simpson in the Below the Canopy podcast

The way people have used and taken care of the land in the past can have a big impact on the plants and animals that live there now. For example, if the soil has been compacted or tilled, it can affect how well trees can grow, and certain species (white spruce, tamarack) may thrive better than others (tolerant hardwoods). Past harvesting practices have favoured taking the largest, most usable trees first for many generations, leaving what was undesirable behind. This has left an undeniable impact on the genetic diversity of the forest that will take time to reverse.

A pre-colonial Wabanaki Forest was likely far more diverse than it is now—including many tree species cultivated by Indigenous communities for food, medicine, construction, and many other uses. But forest restoration is not as simple as returning the ecosystem to a pre-colonial forest. With the projected increases in the frequency and intensity of natural disturbances, as well as how well-suited key species are to a warming climate, it's important to think about which species will be most suited to survive and thrive in the future.

Our Changing Forest video series follows climate researchers, ecologists, and forest professionals as they share the projected climatic changes to the Wabanaki Forest, including how to manage three typical forest stand types using ecological forest management best practices.

Being a Good Neighbour

The colder months of winter are a perfect time to invite your neighbour in for a hot drink to talk about your shared forest ecosystem. *What goals do you share? Where, if any, might compromises be made? How can you support each other?* While it might seem difficult to do, having regular conversations with your neighbours can provide insight into their values and what activities are important to them.

Knowing the location of the boundaries of your land is important, and it is just as important to have good relationships with those who manage the land around you. Your forest is not an island; how your neighbours treat their land will affect your forest, and your actions will affect their forestland too.

Finding Your Property Boundaries

It's important to know where your property boundaries are so you can avoid any misunderstandings with your neighbours. Boundaries are usually marked with **blazes** on trees, but they can be hard to see if they're old. A forest technician can help you find your boundaries, or a licensed land surveyor can help you retrace them.

Blazes: Blazes are face cuts that are painted into trees along the line, usually about shoulder height and marked on both sides of selected boundary trees.

It's important to upkeep your boundaries because having a surveyor re-mark them can be expensive and can potentially stress relationships with your neighbours. Some other indicators of boundaries include

fences, rock piles, and previous cut lines, but these aren't always definitive. So, be sure to look after your boundaries carefully!

The Impact of Clearing Land

Clearing land next to your neighbour's land can have a big impact on their forest. For example, clearing land alongside a boundary line can cause windthrow and higher amounts of light in intact neighbouring stands. For example, if that neighbour is a maple sugar producer, that edge effect means increased potential of windthrow and can negatively impact the maple production over a significant portion of their forest.

A Home for All

Your neighbours include every being that calls your forests and the surrounding areas home. It is important to keep in mind that breaking up forest, through extensive harvesting or road building, can change the habitat for the animals in the area, especially those that require large areas of intact forest. This can displace some specialist animals like fishers and martens and favour species like coyotes and foxes.

Sharing Roads

If each forest caretaker builds their own road, it fragments habitat and increases the chance of invasive species, pests, and pathogens entering the forest, and can negatively impact how water flows on the property. Sharing roads with your neighbours can minimize your joint impact on water quality, wildlife, and intact forests, and it can also save you money.

Think Big Picture

Remember, your forest is one piece within a complex, interconnected, and living ecosystem. Thinking about your forest on this larger ecosystem scale helps improve your forest management planning, supports habitat continuity, improves harvest activities, and provides a deeper understanding of what's happening around you.

Similarly, creating a more complete picture of the history of your forestland is an interesting way to learn about the land and can also guide your future decision-making.

Let's Take a Look at How You Can Start.

To start understanding the history of your forestland, you can use Google Earth or old aerial photography to look back to see if different parts of your forest were harvested or cleared for other land uses. Local forest products marketing boards or forestry cooperatives may have records of what kinds of activities previous caretakers undertook.

Or, ask neighbours or older people in the community about the people who cared for the land before you and how they interacted with it. And keep an eye out for old farm roads and evidence of harvesting like rotted stumps, cut branches and brush piles, remnant piles of logs that may have been left, and even abandoned equipment that might indicate an area's past uses.

Climate-Focused Stewardship

We need healthy and intact forests now more than ever. Carefully managing forests to improve their health and resilience has the potential to sequester and store vast amounts of carbon from the atmosphere and significantly reduce the negative impacts of climate change. Perhaps even more compelling, this natural climate solution already exists on the landscape. We just need to care for it!

Forest carbon programs were developed for just this reason—to value standing forests for their climate benefit. While an imperfect solution, high-integrity forest carbon projects can play an important role right now. Opportunities to participate in forest carbon projects are just starting to pop up across Wabanaki'k. However, barriers still exist for many smaller forest caretakers to participate in these projects. These include long contract periods, minimum acreage requirements, and the overall volatility of the emerging carbon market. Despite all these challenges, market demand for forest carbon continues to grow, offering a unique opportunity for forest caretakers to contribute to climate solutions.

There are several things that you can do right now to best position you and your forest for emerging carbon opportunities. Check out our "Five Ways to Prepare for Carbon Offset Markets" so when the right opportunity comes along, you'll be ready!

Working with a Forest Professional

Finding the right support for your forest management needs can be overwhelming, but there are many people and organizations available to help you based on your values, goals, and needs. If you're looking for information on forest management options or want to develop a forest management plan, you'll want to connect with a forest professional, such as a forest ecologist, forester, or forest technician. These professionals have formal education and training and can help with planning and facilitating forest management activities.

There are various ways to access these professionals in each province.

New Brunswick: The province is divided into seven regions, each with a forest product marketing board. Despite the name, these marketing boards offer more than just selling forest products. The services they provide vary, but generally, all marketing boards offer forest management plans, silviculture treatments, timber harvesting, and boundary line marking. They can also help you access financial assistance for carrying out certain activities.

Nova Scotia: There are several types of groups that engage in forest management. The Nova Scotia Woodlot Owners & Operators Association (NSWOOA) is a trusted organization that supports landowners interested in ecological forestry. Their staff can guide you if you are looking for support or resources in the province. Additionally, there are great forestry cooperatives across the provinces that offer forest management services such as harvesting and silviculture.

Prince Edward Island: the government supports private forest management through its Forest Enhancement Program, which provides forest management plans and silviculture treatments. The province assigns a forester or forest technician to every region and relies on approved private forestry consultants and contractors to carry out the program as well.

It's important to have a clear idea of your goals and shop around until you find a good fit for you. Thoughtful consideration when selecting an aligned forest professional will ensure you achieve the outcomes you're looking for. To get you started, a list of a few of the service providers by province can be found in the resources at the end of this guide.

Working with a Harvesting Contractor

When implemented in a sustainable and thoughtful manner, timber harvesting can be an important part of climate-focused forest management. However, it's important to follow a few key steps to ensure you truly get the outcomes you are looking to achieve.

First, start by talking to a forest professional such as a forest technician or forester. They can assess your forest alongside your individual goals and objectives to help provide you with management options, and depending on your interest, can lead the development of a forest management plan for the forest in your care. This will give you valuable insight for the journey ahead and ultimately help you make informed and well-considered decisions if you decide to engage a harvesting contractor.

Next, you'll want to consider the economics associated with different management options. A forest professional can help prepare an operational plan and explain the anticipated outcomes. It's crucial to weigh these variables against your goals and the needs of your forest to make the choice that's right for you. Before you finalize anything, gather estimates for volumes of merchantable timber treatments and any associated costs for other services such as road upgrades, water crossings, and boundary line maintenance. Seeking recommendations from others who have had positive experiences with similar work can be helpful at this stage.

At this point, you should be clear on the economic considerations including approximate total harvest volume and the species and percentage of trees to be removed (and retained) in each stand. What remains after your harvest will determine the future health and resilience of your forest, and impact both human and natural communities for decades to come.

If you decide to move forward, ensure you have a written contract in place. Handshake agreements are risky, so establish clear deliverables and outcomes from the start. Confirm that the contractor is insured, properly trained, and has a documented safety program, and if possible, you can ask to take a look at their current work site and equipment to assess their professionalism and care.

Prior to the work starting, ask the contractor or professional to provide maps of the harvesting area and ensure they have marked it properly on the ground. Go and walk the area with them to ensure everything is on track. If you prefer or it's more feasible, you can assign this supervision task to a forest professional, marketing board, or cooperative for added peace of mind.

Remember, you don't have to rush into a decision. If you feel pressured or the available options don't meet your expectations, it's okay to wait for the right opportunity. Forests typically don't change rapidly, so take your time to make a thoughtful choice that aligns with your goals and the well-being of your forest.

Winter Reflection

We hope you'll take this season to rest, reflect, and look forward to the future. By making thoughtful decisions and taking purposeful action, you can ensure that your forest continues to thrive and provide a lasting natural legacy for generations to come.

What initially drew you to owning forest land?

How has your relationship with the land evolved over time?

Have your long-term goals for your forest changed?

The Cycle Begins Anew

As a forest caretaker, you will witness the natural patterns of the forest shift, flow, and repeat each season. But just like our own lives, the forest is never stagnant. Growth, decay, and regeneration are all part of the natural cycle. As you care for your forest, you will likely encounter challenges, whether it's a major storm, a changing climate, or your own personal circumstances. Remember, these can all be opportunities to adapt and learn as a caretaker.

The positive impact you can have on the forest is invaluable. The life cycle of a forest extends far beyond any of ours, and as a forest caretaker you have the powerful opportunity to make a significant impact on your part of this ecosystem. By actively managing your forest, you can promote healthy growth and regeneration, protect wildlife habitats, and mitigate the effects of climate change.

In the meantime, you can look forward to March or April, when the sun's warmth will again melt the snow that blankets the forest and the cycle will begin anew.

Further Resources

Visit our website to see a full list of resources and links for each of the seasons to continue your learning.

forestsinternational.org/forestcareguide

Forest Service Providers

New Brunswick

Forest Conservation

Community Forests International
Conservation Council of NB
Nature Conservancy of Canada
Nature Trust of New Brunswick

Forest Management Planning, Silviculture, and Harvesting

ACFOR
Forest Product Marketing Boards

Accessing Financial Support

Forest Product Marketing Boards

Forest Education

Community Forests International
Knowlesville Art and Nature Centre
NB Environmental Network
Nashwaak Watershed Association
Nature NB
New Brunswick Federation of Woodlot Owners

Nova Scotia

Forest Conservation

Community Forests International
Nature Conservancy of Canada
Nova Scotia Nature Trust

Forest Management Planning, Silviculture, and Harvesting

Athol Forestry Co-op
Cape Breton Private Lands Partnership
Conform Ltd.
Family Forest Network
North Nova Forest Owners Co-op
Western Woodlot Services Co-op

Accessing Financial Support

Family Forest Network
Forestry Cooperatives Registered Buyers (sawmills and processing facilities)
The Association for Sustainable Forestry

Forest Education

Confederacy of Mainland Mi'kmaq
Family Forest Network
Healthy Forest Coalition
Medway Community Forest
Mersey Tobeatic Institute
Nature NS
Nova Scotia Woodlot Owners & Operators Association
NS Environmental Network
Unamiki Natural Institute of Natural resources

Prince Edward Island

Forest Conservation

Island Nature Trust
Nature Conservancy of Canada

Forest Management Planning, Silviculture, and Harvesting

Forest Enhancement Program

Accessing Financial Support

Forest Enhancement Program

Forest Education

MacPhail Woods Ecological Forestry Project
Prince Edward Island Woodlot Owners Association

About Community Forests International

Community Forests International is a team of dedicated people who believe that some of the most meaningful climate solutions are found when people live and work closely with forests. Here in the Wabanaki'k region of Turtle Island, this work includes developing knowledge and tools to promote climate change adaptation, training and supporting people like you to enhance the health and ecological benefits of their forests, and directly protecting and restoring forests through old forest conservation, climate-focused forest management, and tree planting.

We believe that people can be a restorative force on the landscape. Together, we can create a healthier forest future for our families, our communities, and for generations to come.

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