

TEND, GATHER & GROW TREE COMMUNITIES



Artwork by Annie Brulé

A module of *Tend, Gather and Grow*, a K-12 curriculum on native and wild plants of the Pacific Northwest. *Tree Communities* introduces common Northwest trees and explores identification, ecological relationships, how trees are valued for food, medicine, and traditional technologies, and life skills that we can learn from trees. Lessons include a tree walk and a deeper look at evergreen conifers.

TREE COMMUNITIES MODULE

In this module, students will learn about common Pacific Northwest native trees, including identification, forest ecosystems, and ethnobotanical uses. They will also explore the qualities that help trees to be resilient, including collaboration, adaptability, and flexibility, and connect these qualities to students' own lives.

Big Idea: *Each tree has unique gifts that contribute to the forest community.*

Vocabulary Focus: canopy, photosynthesis, understory, forest floor, subfloor, evergreen, deciduous, stomata, conifer, epiphyte, snag, nurse log, increment borer, climate, resilience, pitch, resin, collaboration, predators, botanical key, characteristics

Key Teachings <i>Students will come away with an understanding that...</i>	Guiding Questions
<ul style="list-style-type: none"> Northwest trees have a powerful influence on the land including climate, ecosystems, and animal species. Trees develop qualities that help them to be resilient. We can learn from these qualities and apply them to our lives. 	<ul style="list-style-type: none"> <i>What native trees grow around me?</i> <i>Why are trees important to our environment?</i> <i>How are trees resilient?</i> <i>What can trees teach me about being resilient?</i>

Tree Lesson Title	Themes/Activities	Grades
Tree Walk	Identify and learn about trees on a walk	K-12
Evergreen Conifer Trees I	Slideshow, hands-on activity, matching game	K-5
Evergreen Conifer Trees II	Identification with a tree key, make something	6-12
Tend Plant Guide Linked Lessons		
Alder: Community Builder	Lifecycle, drawing, forest succession game	K-5
Big Leaf Maple Hotel	Learn characteristics and relationships, art	K-12
Cedar: Gifts of Grandmother Cedar	Salish story about Grandmother Cedar	K-12
Cedar: Weaving with Cedar	Salish story and weaving activity	K-12
Cedar Medicine	Cedar uses and making cedar steam	6-12
Cottonwood: Water Keeper	Explore lifecycle and characteristics	K-12
Cottonwood: The People's Tree	Explore lifecycle, traditional uses, making medicine	6-12
Meet Douglas Fir	Explore characteristics, draw, group discussion	K-5
The Lifecycle of Douglas Fir	Investigate characteristics, act out lifecycle	6-12
Douglas Fir Food and Medicine	Learn identification, uses, hands on activity	4-12
Hawthorn Lifecycle	Hawthorn characteristics, pollinators, seed distribution	4-12
Hawthorn Heart Medicine	Explore hawthorn characteristics, cardiovascular health	6-12
Willow Sculpture	Make a sculpture using the flexibility of willow	K-12
Willow Water Plant Propagation	Explore willow's rooting hormone and experiment	4-12
Willow Medicine	Harvest and process willow bark, make infused oil	7-12

ACCOMPANYING TEND CURRICULUM MATERIALS & TOOLS

Documents

Tree Communities: Student Handout
Tree Lifecycle Pages (deciduous and evergreen)
Tree Coloring Pages (deciduous and evergreen)
Evergreen Conifer Tree Botanical Key
Evergreen Conifer Trees: Student Handout
Northwest Tree Communities Career Connected Learning

Videos

Tend, Gather and Grow Curriculum Videos: <https://vimeo.com/grubinoly>
Alder: <https://vimeo.com/571847275>
Bigleaf Maple: <https://vimeo.com/571847692>
Douglas Fir: <https://vimeo.com/571848197>
Grandmother Cedar Story with Roger Fernandes: <https://vimeo.com/216042916>

Plant Teachings for Growing Social Emotional Skills Movement Videos

Cottonwood: <https://vimeo.com/614101167>
Hawthorn: <https://vimeo.com/478301976>
Willow: <https://vimeo.com/585505322>

The Teachings of the Tree People: Video on the life and teachings of Skokomish elder, Bruce Miller (20 minute version) <https://vimeo.com/64099709>

NORTHWEST NATIVE TREES

Among Northwest Native Peoples, trees are honored as teachers. Trees demonstrate how to be resilient, including adapting to changes, collaborating with others, being flexible yet strong, and practicing generosity. Each tree has a unique gift that contributes to the health of the forest community.



Trees enrich our world in so many ways. They provide oxygen, shade, food, medicine, and materials to build shelter, make tools, and create art. Trees shape the weather by creating humidity and rain, buffering heat, and softening harsh wind. They also offer beauty, refuge, and a place to play. When we walk through a home, read a book, warm ourselves by a fire, rest in the shade, or eat tree nuts, we are indebted to the gifts of trees.

Trees are a great entry point for budding naturalists. Having a relationship with local trees helps us to feel engaged and at home when we walk in the woods—as if we are entering a room full of friends and not strangers. Each tree has its own fascinating story of form, lifecycle, and relationships that can wake up our senses and ignite curiosity. One could gain a lifetime of learning just by developing a relationship with a single tree. In studying trees, we can learn about biology, math, reading, writing, natural history, ethnobotany, and more, all at once.

New scientific insights and stories about trees are captivating public interest. National bestselling books like *The Hidden Life of Trees* and *The Overstory* are creating a buzz across radio, television, and social media outlets. We can only hope that this public interest will help offset the vast global deforestation that continues to threaten the health of our planet.

In order for young people to connect with trees, they must be given opportunities to *be* with them, especially in wild spaces like forests. Schoolyards can be valuable places to study trees, but they do not offer the complexity of a forest where trees have had time to develop character, overcome adversity, and cultivate relationships with their own kind as well as other species. A forest is a complex web of relationships where we can learn about interdependence and resilience. We have much to learn from trees.

AMAZING TREE FACTS

Trees Breathe: Every tree breathes in carbon dioxide and breathes out oxygen, which people need to breathe.

Trees Cool the Air: Have you ever noticed how much cooler it is in the woods than in the open? Trees cool the air where they grow, in the woods as well as in cities, and they help create rain by exhaling moisture into the air.

Some Trees are Edible: Bigleaf maple blossoms are tasty, and spring Douglas fir, spruce, and hemlock tips are energizing snacks. Hazelnuts and acorns are edible.

Trees Heal: Researchers in hospitals have discovered that people recover from sickness faster if they just spend time looking at trees! Many trees are medicinal.

Trees Prevent Erosion: When raindrops hit tree leaves, they split into smaller drops and land softly. These drops are more easily absorbed into the ground and prevent mud from entering streams and rivers, which, in turn, helps salmon and other aquatic species.

WHAT CAN WE LEARN FROM TREES?

In learning about and building relationships with trees, we come to understand how resilient they are, and we connect with important teachings. We can apply these teachings to our lives. For example, trees **collaborate** with other species around them. When attacked by insects, trees can communicate warning signals by emitting scents to neighboring plants so they can build their own defenses. Through root and fungal networks, trees **share** food and medicine with other trees that need support. Alder trees help regenerate a forest community after fires, logging, or flooding. Through partnering with bacteria, alder regenerates nutrients in the soil. Young trees grow quickly and create environments where other plants and animals can thrive. How can *humans* look to trees as a model for building healthy community through collaboration, generosity, and working across differences?

Douglas fir can **adapt** to many different environments and weather conditions. It survives fires by making thick bark, protects itself from insect infestations, and makes pitch to heal injuries. What helps *us* to adapt in stressful situations?

Oak grows slowly and invests its energy in making deep roots, hard wood, tough leaves, and nutritious acorns. This **patience** pays off during drought, storms, and other challenges. Can *we* reduce our stress as well as others' by practicing patience and thinking about our long-term goals?

Willow grows along the banks of rivers and wetlands, places that are constantly changing. Its **flexible** branches will bend, but not break under the pressure of fast moving waters. It can grow quickly and single branches can take root in the mud. How might being more flexible help *us* in our lives?

Social-emotional skills related to plant teachings are featured in the Northwest Native Tree Walk and in many lessons in the *Tend, Gather and Grow Plant Guide*. For a more in-depth exploration of this topic, see the resource list for *Plant Teachings for Growing Social Emotional Skills Toolkit* at goodgrub.org, which includes a book, plant cards, movement videos, and an activity guide.

*My Elder from Vancouver Island said, "Look at the hills, what do you see?"
And I said, "Oh that is an easy answer, the forest, the trees are there."*

He said, "Well that's exactly the answer 90 percent of the people would give you. But what you see there is the oldest teaching since creation.... It's the teaching of the Tree People... What you see is many nations of trees living side by side from the beginning of time in harmony. We were told in this teaching that we were never to infringe on the diversity of the forest. We need to respect all the things that the other races of people have contributed to this earth. Not to look for the differences but to look for the things that we have in common. This will keep the earth in harmony."

—Bruce Miller (Skokomish), *Teachings of the Tree People*



TREE STORIES

Many cultures, religions, and philosophical traditions around the world contain tree stories. These stories have been told since ancient times and continue to play important roles in peoples' lives. This module includes stories from Coast Salish lands in the Pacific Northwest. Many of these stories include cultural teachings about how to be in the world. For example, the story of Hemlock with its bent top encourages humility, while the story of Grandmother Cedar shows acts of kindness and generosity. Other stories, like how mice got stuck in Douglas fir cones, help us to identify Douglas fir and understand how it survives through challenges like fires.

Stories are included with permission from Native storytellers, and you are encouraged to learn and retell the stories yourself. Give time for student reflection and discussion as each student will have their own interpretations and insights. In Native traditions, stories are told multiple times. This helps listeners remember the story, understand it more deeply, and apply it to their own lives. Out of respect to Coast Salish peoples, always acknowledge where the story comes from and who it was told by.

For most of human history people used storytelling as the primary means of learning, teaching, sharing, and communicating with one another. Today we rely on technologies like writing, reading, film, and computers to do that same work. The assumption is that these new methods are equal or even superior to, the process of oral communication. The ability to share and learn from oral stories adds dimensions to the communications and teaching processes that modern systems lack.

Stories are "given power through the moisture of our breath." *This ancient Native teaching reminds us that the breath we share gives a story its life and from that condition we can find what the story has to teach us at many levels. It is a basic Native belief that stories are living things and our job is to help them on their journey by sharing them.*

The simplest and most basic way to understand all of the above is to simply tell a story. To do this one must have the story memorized and "know it by heart". Once it is known "by heart" it is in one's heart; it is now a part of that person's psyche/spirit and can do its work at that level.

—Roger Fernandes, Lower Elwha Klallam storyteller

Tree Story Activities

- Illustrate, Act Out, or Make a Movie of a Tree Story: Choose one of the stories from this module.
- Tree-Themed Check-in Questions: Begin class with students answering a check-in question like: *What is your favorite tree? Or, share a story about a tree that is special to you.*
- Research a Tree Story: This could be a special kind of tree or an individual tree. It may be from a student's culture or religion, or from a local place. Many cities and counties have heritage trees. For example, the city of Portland has a [heritage tree program](#) with a website and a guidebook documenting old, historically significant, and horticulturally significant trees. Have the student share the story of the tree through voice, art, or by acting it out.

- Imagine the Life of a Tree: Write or draw a story from the perspective of a tree and imagine its life. What clues can you find by observing the tree? How old do you think the tree is? What else can you imagine about its story?
- Find a Tree Sit-Spot: Have students sit with a tree, observe, and document what they notice. You might even have them choose a tree to visit throughout the year to witness and document seasonal changes and species interactions.

LEARNING ABOUT TREES

Trees thrive in their environment by making the most of nature's elemental forces. They use sunlight, air, water, and minerals from the soil to build huge and complex forms—a seemingly miraculous feat. Each tree species has evolved to thrive in its own particular environment. Exploring physical characteristics can help us understand how trees function. Here are a few things to notice:

Is the tree evergreen or deciduous?

Evergreen trees keep their leaves all year long. Most evergreen trees are conifers, but not all. Madrone, holly, and laurel are broad-leaved trees with flowers and fruits instead of cones. Deciduous trees lose their leaves in autumn. Examples include, alder, maple, oak, and willow.

Is the tree a conifer?

These are trees that have cones. Most conifers are evergreen with needle-like or scale-like leaves and light, soft wood. Examples include cedar, fir, hemlock, pine, and spruce. An exception is larch—a conifer that loses its needles each fall.

Is the tree a broad-leaved hardwood?

These are trees that have large, flat leaves. Most broad-leaved trees are deciduous and have hard, dense wood.

Overall Shape: While each tree is unique in its shape, trees of a particular species have common characteristics. For example, hawthorns tend to be shorter trees with a roundish top and densely growing branches. Evergreen trees have a conical shape to help repel snow. Many deciduous trees have upward reaching branches so rain can funnel down to their trunks and roots. Look to see if the tree has a single straight trunk, like alder, or multiple branching trunks, like bigleaf maple. Is the tree very tall and upward reaching, like cottonwood, or medium-sized and often growing in a community, like alder? These characteristics can be helpful in identifying trees. You may want to have students draw tree silhouettes or take pictures of tree shapes. You can also find posters with Northwest native tree shapes from goodnaturepublishing.com

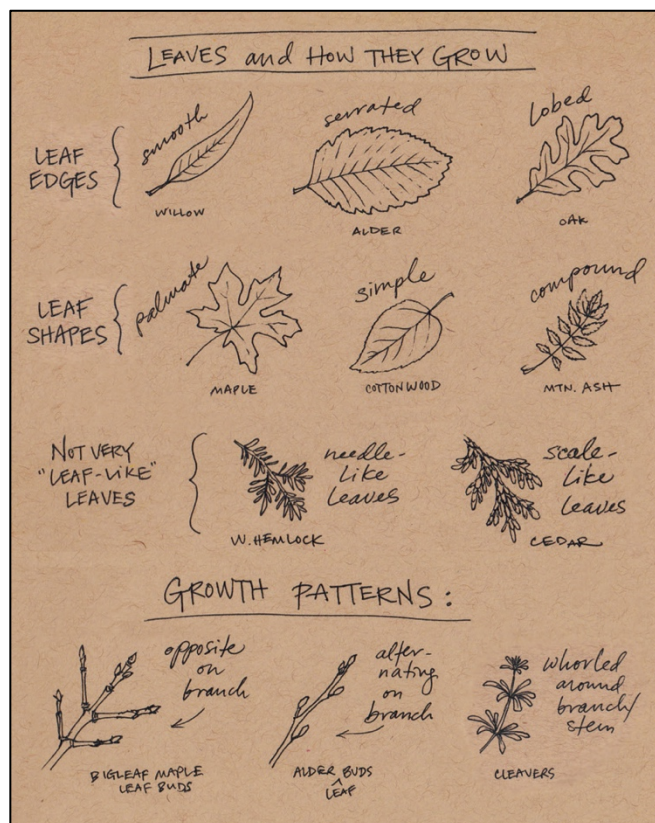
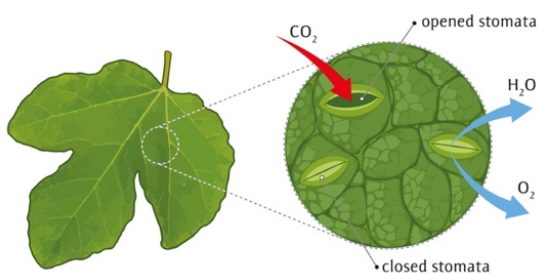


Douglas fir drawing by Lucy Buikema, 5th grade

Leaves: Leaves come in many sizes, shapes, textures, and colors! Encourage students to use all their senses to notice details. Is the leaf smooth, fuzzy, or waxy? How does it smell when crushed or scratched? Can students differentiate shades of green, like the limey-green of Western red cedar, and the bluish green of spruce?

Take a Closer Look!

Trees breathe through their leaves. The under-sides of leaves contain thousands of stomata that open and close like tiny mouths. You can see them with a magnifying lens or microscope. Stomata breathe in carbon dioxide from the air and breathe out oxygen. When we stand by a tree, we share breath with it—giving and receiving the gases we each need to survive. If it gets hot, trees close their stomata so they do not lose moisture and get dehydrated.



Seeds: Trees form seeds as a part of the reproduction cycle. There are two types of seed plants: non-flowering (gymnosperms) and flowering (angiosperms).

Non-flowering Seed Plants: Conifers like Douglas fir (pictured) and cedar are gymnosperms. Gymnosperms do not have flowers. They have two types of cones—male and female. Male cones are short lived and have pollen that travels on the wind. When this pollen lands on female cones and enters the ovule, it fertilizes them, eventually maturing into seeds.



Flowering Seed Plants: Many broadleaf trees like oak and maple are flowering seed plants, or angiosperms. Flowers are the reproductive organs, and when pollinated, grow into fruit. Northwest native tree flowers tend to be small. They have distinct arrangements like the catkins of alder and willow. Fruits form from flowers after pollination and are the seed-bearing organs of plants. Angiosperms produce seeds that are "clothed." Think back to summertime and eating a fresh plum. The part of the plum that you eat is "clothing" the seed at the hard center. Examples of flowering tree seeds include fleshy fruits like hawthorn, nuts like acorns and hazelnuts, and the winged fruit of maple.

Stems and Trunks: Tree stems and trunks are like straws, carrying water and minerals up from the roots to the leaves, and sugar down from the leaves to the roots. This is similar to our cardiovascular system, but with the blood being sap—a liquid made of mostly water with minerals, hormones, and sugars the tree needs to grow.

Outer Bark: The outer bark is like the skin of a tree. It protects the inner bark, or cambium, from dehydration and damage. If the outer bark is damaged, the tree can make pitch, which helps protect the tree from diseases. Bark changes as trees get older, just as our skin changes as we age. Each tree has distinctive bark characteristics including:

- Plates: Spruce, ponderosa pine, Garry oak (pictured far left)
- Grooves or furrows: Douglas fir (pictured center left), hemlock
- Blisters: True firs, including grand fir (pictured center right)
- Peeling or grows in strips: Cedar, madrone, yew (pictured far right)



Are Trees Like People?

Trees are not so different from people. They have a skeleton (heartwood), blood vessels that carry nutrients and waste products (inner bark), and skin (outer bark). They breathe, drink water, and communicate with other plants and animals.

Unlike people, trees spend their entire life rooted in one place. Imagine if we could get everything we needed while standing still!

Also, trees sleep at night like we do, turning off their production of oxygen and sugars. In the morning their drooping branches perk up and they turn their leaves toward the light.

Inner Bark: The cambium is the inner bark of the tree, and contains cells that build new bark and new wood. In the warm season, trees grow fast and produce “earlywood” that is light colored. In the cold season, trees grow more slowly and produce “laterwood” that is dark and dense. This alternating pattern of light and dark color creates growth rings. The cambium also includes the phloem, where plant foods, like sugar created from photosynthesis and other nutrients, are transported from the leaves to the roots and other storage vessels.

Sapwood: The layer next to the cambium is the sapwood, or xylem. It imparts strength and transports water and minerals upward from the roots to the branches and leaves in tiny tubes called vessels. Saying the word “skylum” will help you remember that it carries the sap up toward the sky. Scientists still don’t understand how trees get water all the way to the crown, or the top of the tree!

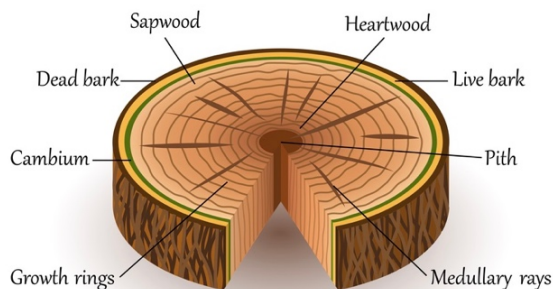
Heartwood: This is the strong, inner part of the tree. Even though it is not living tissue, it remains strong when protected by the outer layers of the tree.

Roots: Roots anchor trees so they can grow tall and withstand wind and other environmental disturbances. Some tree roots can be as deep as the tree is tall, while others spread over the surface of the soil like a web. Tree roots drink water and gather nutrients from the soil.

Fungi are important in building soil.

Mushrooms are simply the exposed fruiting body of fungi, while the vast underground network of roots are called mycelia. These mycelia are made of tiny hair-like filaments which release enzymes that break down soil and create a nutrient-rich broth that fungi and plants can absorb. Fungi increase the nutrient intake of trees by connecting to the roots and growing cottony threads so they can absorb more water and minerals. Fungi can also guide roots to find the best places for nutritious soil and water. In exchange, the tree shares its sugars with fungi, which cannot photosynthesize. The union of roots and fungi is called mycorrhiza. This is an example of a symbiotic relationship called mutualism in which both organisms benefit from the relationship.

TREE TRUNK STRUCTURE



Discover A Tree's Story

You can learn a lot about the life story of a tree when you look at a cross section of its trunk. Count the growth rings to determine the tree's age. Rings are thicker when there are optimal growing conditions and thinner when conditions are dark, cold, or dry. When a tree is consistently exposed to wind or other forces, the growth ring is narrower on that side of the tree and wider on the side that needs extra strength to hold it up. You might also see old scars from fire or insect damage. Scientists use a tool called an increment borer to take tiny cross sections of trees without hurting them much. With this tool, they can discover big events in a tree's life. Researching tree stories helps us to understand climate change.



NOTICING TREES THROUGH THE SEASONS

The *Tend, Gather and Grow Curriculum* promotes “the art of noticing,” or waking up all of your senses so that you can be a keen observer. These are valuable skills whether you are a scientist, an amateur naturalist, a gardener, a hunter, or a gatherer.

Phenology is the study of seasonal cycles in plant and animal communities. When you notice the first bud burst on a cottonwood tree, robins returning after winter, the first ripe salmonberry, maple leaves changing color, or geese migrating south, you are practicing phenology. Seasonal indicators have long been important to our ancestors—for example, knowing when to travel to the mountains to hunt and gather food, when to plant a crop, or when to dig roots. This knowledge has been documented and shared in oral tradition and stories throughout history, and continues to be a popular pastime. Magazine articles, podcasts, and social media posts with seasonal knowledge on wild foods, gardening, and animal behaviors are easy to find.

Phenological records help us to understand climate change. By looking back at records, we know that buds are bursting open days to weeks earlier than even 100 years ago. Changes in the timing of a tree’s life cycle can affect insect life cycles who depend on that tree, and in turn, changing food availability for birds that eat those insects. If those birds don’t have enough to eat, their population dwindles.

Phenology Lessons and Activity Ideas

- Keep a Field Journal: Document changes in trees in your neighborhood or at a local park. If students don’t have access to trees in their neighborhood, they can watch live stream nature cameras.
- Watch the video *Phenology and Natures Shifting Rhythms*: A Ted Talk by Regina Brinker <https://www.youtube.com/watch?v=RNs3XpRmRfI>
- Citizen Science: Citizen science programs work with large numbers of people across different regions to gather data that helps scientists to understand changes in climate and develop adaptive strategies. Have students participate in programs like [Project Budburst](#) and USA National Phenology Network’s [Nature’s Notebook](#).

Winter: While conifer trees keep their leaves in winter, deciduous trees are bare. This is an opportunity to see tree shapes and features that might be hidden the rest of the year.

- Tree Shapes: While each tree is unique, tree species have general characteristics, like Douglas fir’s upward swooping branches, or the multiple trunks of bigleaf maple. Draw or photograph tree shapes.
- Look for Forest Pathogens: Forest pathogens, or diseases, don’t always mean that a forest isn’t healthy. These pathogens range from helpful fungi, like turkey tail and red belt, to parasitic plants like mistletoe. Forest pathogens can support the life cycle of a healthy, balanced forest. However, climate change and other changes or disturbances in the forest can stress trees, creating an imbalanced relationship between trees and forest pathogens. Often, you can look to the base or trunk of a tree to find fungi. If you come across a snag or decomposing tree trunk, look inside. To find parasitic plants, look in oak or juniper branches.

- Nests and Animal Homes: Nests are hidden in the safe camouflage of deciduous tree leaves until winter. Try to guess which creature built the nest. The materials, size, and location are great clues. Are there any signs of who might be living in tree hollows?
- Winter Twig Identification: When outside exploring, find some twigs and ask: Do buds grow opposite or alternate along the stem? What is the color and texture of the stem? See books and online resources for winter twig identification.

Spring: Leaf buds emerge and flowers bloom as plants respond to warmer temperatures and longer days with increasing sunlight. Flowers on the forest floor, including trillium, violet, spring beauty, salmonberry, and red flowering currant, take advantage of sunshine before deciduous trees leaf out and cast their shade. Deciduous trees know it is spring by the amount of daylight and must choose when to bud. If they choose to do this too early, their tender young shoots might freeze.

- Noticing Changes: Pussy willows bloom when branches are bare so their pollen can be easily carried in the wind without the interference of leaves.
- Eat Forest Food: Spring is a great time to eat bigleaf maple flowers and shoots as well as edible evergreen conifer tips.
- Listen: Animals begin to frequent the forest more from near and far. When you take a moment to be silent, what do you hear? You might hear or see migratory birds use trees for places to rest during their long journey. You can even learn to identify each bird by just their [sound](#).

Summer: This is a great time to notice relationships within tree communities. These relationships may be between trees, animals, other plants, and humans too!

- Journal: Use a journal to track when fruits or cones develop and ripen. Who is eating ripe fruits and seeds? Who is nesting and living in trees?
- Leaf Rubbings and Identification: In summertime, leaves are fully developed and can be used for art projects. Make leaf rubbings, or press leaves in a book and mount them on paper. Add notes about what you are learning about the tree.
- Have a Tree Snack: Hazelnuts are ripe in late summer and are delicious to eat if you can find them before birds and squirrels do. You can still eat tender tips of edible trees like hemlock and Douglas fir.

Fall: Trees sense that it is getting colder and darker. Different trees prepare in different ways. Deciduous trees release chlorophyll from their leaves before they drop, but other pigments remain, often giving us the dramatic yellows, oranges, and red colors of fall.

- Leaf Pressing and Mobiles: Find colorful leaves and press them in a book until they dry. Make leaf mobiles by hanging the leaves from a string on a decorative branch.
- Leaf Crowns: Use stems to pin leaves together. Add fun forest decor including lichen, moss, and seeds.
- Tea: Fruits, including hawthorn, are ripe and ready to harvest for tea.
- Acorn Flour: Acorns can be harvested, leached (rinsed for an extended time or soaked with water to remove tannins), dried, and ground to create flour. Acorn flour can be used in place of or mixed with normal flour.

FOREST COMMUNITIES

Forests cover about 30 percent of the land on Earth. This document explores common trees that grow in forests in the Pacific Northwest, a region from Alaska to central California, and from the shore of the Pacific Ocean to the crest of the Coast Mountains of British Columbia and the Cascade Range.

Conifer forests are made of mainly tall evergreen trees that grow closely together. Though little light reaches the forest floor, many creatures find food and shelter there. The most magnificent conifer forests in the world grow in the Pacific Northwest, reaching their maximum size and age. Conifers are well adapted for extreme cold, heat, and drought.

Hardwood forests are made of broad-leaved deciduous trees, including alder, cottonwood, and willow. These trees are generally more short-lived than conifers and tend to grow in changing landscapes like along rivers, floodplains, or in the wake of fires, slides, and clear cuts. Oaks can withstand fires and drought, and live to be very old. Mixed Forests contain both evergreen conifers and broad-leaved deciduous trees.

Forest edges are places of transition where two or more ecosystems meet. Trees thin and meet rivers, meadows, and open prairies. These places attract and support many different kinds of plants and animals. Berries, nuts, and other native foods are often most productive in forest edges because they get more light.

When you look at a forest, trees come in a variety of sizes and shapes. Some are tall and seek out sunlight, whereas others are smaller and love shade from taller trees. The diversity of tree shapes and sizes creates different levels within a forest. These levels include:

The canopy is the highest layer and contains all of the leaves and branches of the tallest trees. Trees that reach the canopy get the most light and share food they make with young and struggling trees. Gardens of mosses, lichens, liverworts, and ferns may grow on tree branches, drawing their nutrients from the atmosphere, rain, and fog drip. They contribute these nutrients back to the forest ecosystem. The canopy provides nesting sites, homes, and highways for many types of insects, birds, and mammals.

The understory is formed by smaller trees, shrubs, and snags. These plants need to survive in partial shade, and often grow where there is an opening in the canopy. Understory trees benefit from the photosynthesis of larger trees in the canopy above them through mycelia networks.

The forest floor covers the soil and includes grasses, ferns, and herbs that provide food (nectar, berries, and seeds) to insects, birds, and mammals, including mice, bear, and deer.

The subfloor of the forest includes the soil, roots, fungi, rocks, and tiny creatures that live or move down there. Fungi help trees to grow better and cycle nutrients back into the soil from dead wood and plant matter.



Old Growth Forests: Trees in an old-growth forest are part of a complex, natural functioning ecosystem with minimal human disturbance. Indigenous Peoples have stewarded old-growth forests for many thousands of years in the Pacific Northwest. It takes 175–250 years for old-growth characteristics to begin to appear in forest stands, and most old-growth trees are 350–750 years old. Some can live thousands of years. All of the generations of trees are present. Adult trees stand like pillars and create shade on the forest floor, while young ones grow slowly until there is an opening in the canopy. As much as 20% of a forest's biomass is made of dead trees. Soon after a tree dies, insects including bark beetles, wood borers, termites, and ants, as well as fungi and bacteria begin to decompose the tree. Snags are standing dead trees that provide wildlife habitat including nesting sites and a source of food for insects and birds.

Fallen trees are called nurse logs because they act as nurseries for forest seedlings that have a difficult time getting started on the mossy and densely covered forest floor. You might notice hemlock, cedar, and red huckleberries growing on nurse logs and stumps. An old-growth cedar nurse log can take 1,000 years to break down completely! Nurse logs are important to old-growth forests because they release nutrients into the soil and provide food, living space, hiding places, and travel routes for many animals from millipedes, to salamanders, to squirrels.

Animals like spotted owls, marbled murrelets, fishers, and martens are dependent on old-growth forests and will perish without them. At least 20 amphibians, 30 small mammals, and 70 species of birds are known to be associated with old-growth forests. Old-growth ecosystems have adapted to dramatic shifts in climate and weather patterns over millions of years, and can also recover from natural disasters including wildfire. They may prove to be a refuge for species in the face of climate change, but only if they are protected from logging and other human development.



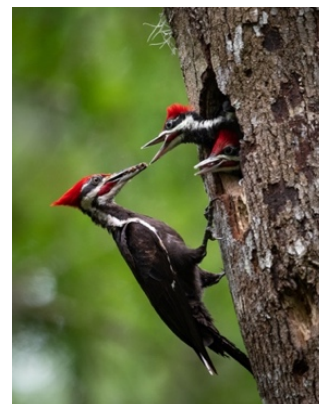
Forest Disturbance: Disturbances can be both natural and human caused and contribute to what we call forest succession. Forest succession is the change in plant species over time that leads toward a stable forest. In Western Washington a stable, or “climax” forest is made of shade-loving hemlock, Sitka spruce, and western red cedar. Disturbance, including fire, storms, and flooding, is the nature of life. While some people often think of naturally occurring fire as destructive, ground fires improve soil by transforming leaf litter into mineral ash, thus increasing soil fertility. Cooler fires may also remove dead and diseased trees, keeping parasites and insect pests in check. Douglas fir, lodgepole pine, fireweed, huckleberries, and many other plants need sunlight to grow and thrive after fires.

In the wake of flooding, wind-borne seeds of alder, willow, and cottonwood grow quickly. These “nursery trees” create a habitat where many species of plants and animals can thrive. These young forests are eventually replaced by evergreen conifers until the next disturbance. And the cycle continues on and on.

Forest Relationships: While forests are defined by their trees, “forest ecosystems” include the communities of plants, animals, microbes, and all of the other organisms that are functioning together in a complex web of relationships. The organisms involved in a forest ecosystem are interdependent, meaning that they depend on

one another for survival. Symbiosis—a close and interactive relationship between two organisms—exists everywhere in forests. Mutualism is a type of symbiosis where both species benefit. Examples of forest mutualism include:

- Lungwort lichens grow on bigleaf maple branches and other trees in the forest canopy. They fix nitrogen from the air and fertilize the soil when they fall, thus supporting the trees and plants. Lungwort is an important nutritious winter food for deer and elk.
- Woodpeckers feed on insects in snags. They excavate roosting and nesting cavities. These roomy dry cavities are later used by Douglas squirrels and flying squirrels, chipmunks, owls, wood ducks, bats, fishers, and martens. Thirty-five to forty percent of bird species common to Northwest forests may use the cavities for nest sites.
- Salmon spawn up streams, and bears, eagles, and river otters carry the salmon into the forest to eat them. The leftovers become food for many animals and eventually decay, fertilizing the soil. Decomposing salmon in streams feed baby salmon.
- Truffle fungi live in the soil and develop symbiotic mycorrhizal relationships with trees, getting carbon and sugar from trees in exchange for helping the trees to access more water and nutrients. Animals including jays, quail, squirrels, chipmunks, rabbits, marmots, mountain goats, elk, deer, and bear eat truffles, which contain important vitamins and minerals that are not available anywhere else. When these animals poop, they disperse truffle spores to new areas. High intensity fires and mono-crop forestry damage truffle populations and affect the whole forest food chain.



CARING FOR TREES

Trees help solve some of our toughest environmental problems, including air pollution and global warming. People are cutting down trees faster than they are planting them. Seasonal fires on the West Coast have burned vast areas of forest. What can we do to help trees?

- Reuse bags when you go shopping and use less paper. Paper is made of trees. Also bring a reusable cup with you so you don't have to use paper cups.
- Recycle paper products and buy recycled paper products.
- Plant a tree – pick species that grow naturally in your area as they will be more likely to survive. It will also provide food and shelter for local wildlife.
- Remove invasive species like ivy and/or holly and replant native plants.
- Get involved with a local environmental organization and/or help maintain a local nature trail or park. Build a relationship with a local forest or a particular tree.



MORE TREE ACTIVITIES

Get to Know Trees with Your Senses

The truth is, you don't need to know a tree's Latin or common name to properly introduce yourself. Using your five (or six) senses, you can experience and learn from a tree directly.

With Your Eyes: What is the general shape of the tree? What shades of green or brown or gray is the trunk and branches? What animals and insects are in the tree? Is the tree by itself or surrounded by other plants?

With Your Ears: Close your eyes. What sounds is the tree making? Is there creaking as the wind moves the tree or its leaves? Are there animals making sounds in its branches? Water running nearby?

With Your Nose: Close your eyes. As you bring your face closer to the tree trunk, what do you smell? Does the smell remind you of anything in particular or bring back memories from your past? Now, find some leaves/needles and rub them between your fingers. What do you smell now? What adjectives would you use to describe it to someone else?

With Your Hands: Gently run your hands down the trunk? Is it rough, smooth, sticky, groovy? Is the tree warm, cold, or the same temperature as you? Now, feel the leaves. Are they prickly, soft, round, angular, short, long, flat? Can you wrap your arms all the way around your tree?

With Your Taste Buds: Safe trees to taste include alder, bigleaf maple, cottonwood, hawthorn, willow, Douglas fir, true firs, hemlock, madrone, pine, and spruce. Take a small piece of leaf/needle/flower and put in your mouth. What flavors are there? Is it pungent, lemony, sharp, sweet, sour, bitter? CAUTION: yew is toxic and should not be eaten.

With Your Mind's Eye: As you experience the tree, are there thoughts, images, feelings, or memories that show up? Is there a general impression that you get from the tree? Is there a thought or message that you want to share with the tree?

Make Tree Rubbings

Leaf Rubbings: Have each student make leaf rubbings by placing a leaf under a piece of paper, holding it stationary, and using a peeled or large round crayon to make an imprint. This is easier for younger children if they partner with someone. You can make greeting cards by cutting card-sized pieces of paper for this. Once students have made their rubbings or prints, have them glue them on blank cards and embellish them with stamps, glitter glue, or small stickers to make tree-themed greeting cards.

Bark Rubbings: Make bark rubbings by placing paper over the trunk and using a peeled crayon or charcoal to get an imprint. Medium to heavyweight paper works best.



Books

Plants of the Pacific Northwest Coast by Pojar and MacKinnon

The Hidden Life of Trees by Wohlleben

Can You Hear the Trees Talking (Young Readers Addition) by Peter Wohlleben

Trees and Shrubs of the Pacific Northwest by Mark Turner and Ellen Kuhlmann

Curricula

Starflower Habitat Education Activities: https://www.wnps.org/education/resources/documents/K-5_Q&E/2nd_grade/2-2b.pdf

Pacific Education Institute Carbon in Forests – Grades 5 through high school:

<https://pacificeducationinstitute.org/download-teaching-materials/?pid=forests&postid=3946>

Resources for families around getting out in nature: <https://www.plt.org/activities-for-families/>

Videos

Intelligent Trees Documentary. 2016, 45 minutes, Directed by Julia Dordel and Guido Tolke

Call of the Forest: The Forgotten Wisdom of Trees Documentary 2016, 1 hour 22min. directed by Jeff McKay

The Secret World of Trees Documentary: <https://www.youtube.com/watch?v=k9fBEc-dRYI>

The Teachings of the Tree People: Video on the life and teachings of Skokomish elder, Bruce

Miller. <https://vimeo.com/64099709>

Forest Fast Breaks: short videos on forest management, tree biology, wildlife, wood products, etc.

https://www.youtube.com/playlist?list=PLS8kydnMHQ9k8teSRSMGqLYn3fOqZjV_8

All photos from Elise Krohn or noted in text except:

Increment Bearer: Stephanie Cowherd, courtesy San Carlos Apache Natural Resources Department and Youth Practicum Participants.

Tree Trunk Structure Illustration: [112301375](#) © [Elina Yakhontova](#) | [Dreamstime.com](#)

Mushroom mycelia: [104453099](#) © [Empire331](#) | [Dreamstime.com](#)

Pileated woodpecker: Photo [147131221](#) © [Harry Collins](#) | [Dreamstime.com](#)

Photo of Bruce Miller: Diana Wilmar

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NORTHWEST NATIVE TREE WALK

Time: 45 minutes to 1 hour
Season: Any
Age: K–12
Setting: Outdoor



Overview: Students take a walk and practice the art of noticing by using their senses to identify and investigate trees. Through exploring the unique qualities of each tree, the teacher makes links to social-emotional skills, and asks students to relate those to their own lives.

Student Wondering: *What trees grow around me? What unique qualities help trees to be resilient? What can I learn from trees?*

Learning Objectives	
<p>Understandings <i>Student will understand that...</i></p> <ul style="list-style-type: none"> each tree has unique qualities that contribute to a forest community trees develop qualities and relationships that help them to adapt to challenges 	<p>Knowledge and Skills <i>Student will be able to...</i></p> <ul style="list-style-type: none"> use sensory observation to learn about trees identify five trees based on their physical characteristics name a tree teaching that builds social-emotional skills

NGS Standards: Performance Expectations		
<ul style="list-style-type: none"> MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive. 2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats. 3-LS3-2 Use evidence to support the explanation that traits can be influenced by the environment. 5-LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water. 5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. HS-LS2-5 Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere and geosphere. 		
Scientific and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<ul style="list-style-type: none"> Constructing Explanations and Designing Solutions 	<ul style="list-style-type: none"> LS2.A: Interdependent Relationships in Ecosystems LS2.B: Cycle of Matter and Energy Transfer in Ecosystems 	<ul style="list-style-type: none"> Energy and Matter

Vocabulary: canopy, photosynthesis, understory, forest floor, subfloor, evergreen, deciduous, stomata, conifer, epiphyte, snag, nurse log, increment borer.

Background knowledge: This walk can be adapted for kindergarteners through adults, and can be led in a schoolyard or neighborhood with native trees, or a local forest trail.

Materials

- Students should wear proper gear to keep them warm and dry
- Tree Lifecycle Pages
- Student journals and writing/drawing tools
- Northwest Trees student handout (at the end of this lesson)

Preparation: Find a tree walk or forest walk where students can safely gather around trees—preferably with a sidewalk or a wide pathway. Review the *Tree Communities Overview* and the *Northwest Trees* handout and choose information that is appropriate for your students' knowledge level and the trees/forest you will be visiting.

Land Acknowledgement: If you are visiting a forest or local park, you may want to begin your walk with a land acknowledgement. Students can research the Indigenous peoples of the territory they reside on and explore the history of the land, how colonialism has affected the well-being of Native people and the land, and what they can do in their classroom/school/community to help heal the past and avoid more harm. For more information on creating a land acknowledgement see <https://www.morningsidecenter.org/teachable-moment/lessons/creating-class-land-acknowledgment-statement>. If you are visiting a park or local forested area you may also want to do some background research including history, management, and any current issues affecting the place.

Additional Tree Research: You can do additional research on trees you will be meeting along the walk. The *Tend Plant Guide* includes overviews and lessons for alder, cedar, cottonwood, Douglas fir, hawthorn, and willow. The *Evergreen Conifer Trees Overview* includes most native evergreen conifers including cedars, hemlocks, pines, spruces, true firs, Douglas fir, and yew.

Tree Stories: *The Evergreen Conifer Trees Overview* includes a story section including

- How Mice Got Stuck in Douglas Fir Cones
- Why Hemlock Has a Bent Top
- Grandmother Cedar Tree

If you are seeing cottonwood trees you can read or listen to this story as told by Mary Louise Defender Wilson (Dakota)

- Written: https://files.dnr.state.mn.us/education_safety/education/plt/activity_sheets/star-cottonwood-tree-story.pdf
- Audio: https://www.youtube.com/watch?v=WPVvIKEi_d8

LESSON: NORTHWEST TREE WALK

INTRODUCTION

10 MINUTES

Land Acknowledgement: Have the class circle up and begin with a land acknowledgement. This is a statement that recognizes and honors Indigenous peoples as the original stewards of the land. It helps students get grounded through asking the question, "Where am I?" You can also share some context on the history of the place you are visiting and current issues, like who is caring for the land.

Set Ground Rules for Your Time Outside: Have students lead a safety discussion. **Ask:** *What is important to remember when we are learning together outside?* Fill in missing information—for example; stay with the group, "one mic," or only one person talks at a time so everyone can hear, respect nature and each other, don't eat anything or keep anything without asking the teacher first.

The Art of Noticing: At the beginning of your walk, encourage students to wake up all their senses so they can fully notice their surroundings. You can lead them through waking up each sense by sharing/practicing the following activities:

- Owl Eyes: Owls have both binocular vision meaning they can focus ahead on a specific object, and have a wide field of side vision where they can perceive movement. Have students make binoculars with their hands, then invite them to see how wide their vision can be by spreading their arms and seeing how far their peripheral vision extends.
- Deer Ears: Deer have very good hearing that is aided by their large ears. Invite students to cup their hands around their ears and notice how their hearing improves. They can also change the direction of their hands if they want to hear behind them.
- Salmon Nose: Salmon are able to smell their way from hundreds of miles to their homes. Invite students to close their eyes and notice what they smell.
- Fox Feet: Foxes walk very softly and quietly to sneak up on their prey. Their feet are so sensitive that they can feel vibrations in the ground. Have students walk heel-to-toe setting their foot down very carefully and quietly.
- Raccoon Fingers: Raccoons have very sensitive fingers to feel texture, temperature, and moisture. Invite students to use their sense of touch to explore the trees.

Tree Ambassadors: Tell students that you will be exploring several types of trees, and each of them will be responsible for remembering a tree plus a defining characteristic or fun fact about that tree. Each time you talk about a tree, ask "Who will be our (Hemlock) ambassador?" Have students take a sample of their tree to keep for the remainder of the walk. If there are more students than trees, you can create plant groups or teams and ask each student to remember a different thing about their tree. Five to 10 trees are a good amount to introduce in a walk, and it is best to do fewer plants for younger students.

Notice Forest Levels: If you are in a forested area, introduce the vertical levels of a forest. Notice how trees in the **canopy** are very tall and seek out light. They are making a lot of food through **photosynthesis**, and may share their food and medicine with young or sick trees. What is growing in the **understory**? You might see shorter trees and shrubs like vine maple, yew, ocean spray, Indian plum, and devil's club. What plants and animals do you notice on the **forest floor**? Herbs, ferns, and mosses might be abundant plants here. What might you find in the **subfloor**? Fungi, animals, and microorganisms on the forest floor and the subfloor help to recycle nutrients from dead plant and animal matter back into the soil.

Tree Identification: As you walk, share information about trees you encounter. You can have students point out identification characteristics from the tree lifecycle pages. Encourage students to explore the tree with all their senses, like noticing the feel of the bark, the smell of leaves when crushed, and if appropriate, the taste of edible parts of the tree. Introduce characteristics and terms that will help students identify the tree. For example:

- Notice the overall tree shape. Does it have a single trunk or multiple trunks? Is the top pointed in a triangular shape or rounded like an umbrella?
- Is the tree **evergreen** or **deciduous**?
- Are the leaves needle-like? If so, what is the color on the top and the bottom? Can you see lines on the bottom? Look closely, these are **stomata**—tiny openings like mouths where the tree breathes.
- If the tree is broad-leaved, are the margins smooth or serrated? What is the overall shape? Are the branches and buds growing alternate or opposite to each other on stems?
- What do the tree's reproductive parts, including flowers, fruits, and/or cones look like? If it has cones, it is a **conifer**! Can you find any seeds? How do you think the seeds travel?
- What is the color and texture of the bark?
- Does the tree have **epiphytes** growing on it?
- What plants and animals do you notice living in the canopy of the tree, the understory, the forest floor?

Tell Tree Stories: See preparation section of this lesson for ideas.

Nurse Logs and Snags: If you are in a mature forest share that all the generations of trees are present. As much as 20% of a forest's biomass is made of dead trees and this is a sign of a healthy forest! Soon after a tree dies, insects including bark beetles, wood borers, termites, and ants, as well as fungi and bacteria begin to decompose the tree. **Snags** are standing dead trees that provide wildlife habitat including nesting sites and a source of food for insects and birds. Fallen trees are called **nurse logs** because they act as nurseries for forest seedlings that have a difficult time getting started on the mossy and densely covered forest floor. You might notice hemlock, cedar, and red huckleberries growing on nurse logs and stumps. An old-growth cedar nurse log can take 1,000 years to break down completely! Nurse logs are important to old-growth forests because they release nutrients into the soil and provide food, living space, hiding places, and travel routes for many animals from millipedes, to salamanders, to squirrels.

Investigate a Tree Story: if you see the cross section of a tree trunk you can share some of the things that help us to understand a tree's story. Count the growth rings to determine the tree's age. Rings are thicker when there are optimal growing conditions and thinner when conditions are dark, cold, or dry. When a tree is consistently exposed to wind or other forces, the growth ring is narrower on that side of the tree and wider on the side that needs extra strength to hold it up. You might also see old scars from fire or insect damage.

You can also investigate a tree story with a living tree. Measure the circumference with a measuring tape or the number of students who can reach their arms around the tree and then measure their arm span once you get back to the classroom. Use math skills to find the diameter of the tree. What do you notice about the tree's life based on its growth form? Are there prevailing winds, old scars, insect damage, etc. Scientists use a tool called an **increment borer** to take tiny cross sections of trees without hurting them much. With this tool, they can discover big events in a tree's life. Researching tree stories helps us to understand climate change.

Narrow Trail Activity: When travelling along a narrow trail with a long line of students behind you, it can be hard to point out interesting plants, trees, or ecological relationships. Try this! Ask the first student in line to stand on the side of the trail and share a short tidbit of plant information you give them with passing fellow students. Once everyone passes them, they can join the end of the line. After 10–20 more feet, the next line leader can be given a new tidbit of information to teach and it goes on and on. Examples of short teachings: "This is a trillium. Notice my 3 leaves and 3 petals" or "This Douglas fir has a super groovy trunk!" or "Notice all the little Hemlocks growing out of this nurse log."

TYING IT TOGETHER

20–40 MINUTES

Group Discussion: Circle up with the class. **Ask**: *Share one thing you'll remember about trees from our walk.* Give each student a chance to respond. Or, if you have used the Tree Ambassador activity, invite each student (or group) to share some thing that will 'stick' with them about their tree.

DIGGING DEEPER

Mapping Project: Have students draw a birds-eye view map of trees along the trail or walk in their journal. They can draw identifying features for trees, animals they saw, and other features that might be memorable. See Capitol Land Trust's Bayshore Preserve map for an example:

https://www.google.com/maps/d/u/0/viewer?ll=47.247456444228966%2C-123.04222518975007&z=19&mid=1tOWm84i42LT_1JjL4oU-qPGrTMkvpLsm

Tree Sit Spot: A sit spot is a place where a person can be quiet in nature and observe their surroundings while engaging all their senses. It is an opportunity for inner reflection, mindfulness, and building sensory awareness skills. Have students choose a quiet place with a tree they would like to get to know. Have them sit silently for 5–20 minutes and journal or record general observations. Younger children will likely have a shorter attention span while some adults may want to sit longer than 20 minutes. Visiting a sit spot can be repeated weekly, monthly, or once per season, but the more often people go to their sit spots, the more seasonal and natural

observations will be made. Developing a relationship with the land takes time, and like any relationship, becomes more meaningful with consistency and effort.

Tips: Students will need a journal and pen or pencil for writing and drawing (water resistant paper if possible), a towel or other water-resistant material for sitting on, and appropriate clothing for weather. Encourage silencing or leaving behind electronics.

Watch Tend Tree Videos:

Alder: <https://vimeo.com/571847275>

Bigleaf Maple: <https://vimeo.com/571847692>

Douglas Fir: <https://vimeo.com/571848197>

Grandmother Cedar Story with Roger Fernandes: <https://vimeo.com/216042916>

Tree Social-Emotional Teachings: For more information on what trees can teach us, see the *Plant Teachings for Growing Social-Emotional Skills* toolkit including a book, cards, and an activity guide.

<https://goodgrub.z2systems.com/np/clients/goodgrub/product.jsp?product=583&>

NORTHWEST NATIVE TREES

This handout introduces some common native trees in the Pacific Northwest region. Each tree has unique qualities and relationships that help it to thrive. In learning about trees, we come to understand how resilient they are, and we can apply these teachings to our lives. For example, trees collaborate, adapt, and demonstrate flexibility and generosity. What is your favorite tree? What might it teach you?

If you are harvesting trees for food, medicine, or materials, consider these guidelines:

- Make sure you have positively identified the tree! A few trees, like yew, are toxic.
- Avoid harvesting from roadsides, industrial areas, or other places that might have been sprayed with herbicides or pesticides. These can make you sick.
- When possible, harvest tree parts that have recently fallen. If you are taking parts from the tree, leave enough for the tree to stay healthy and reproduce, and for other animals who rely on the tree for food.
- What can you give back? Some people leave a gift, a song, or a prayer as thanks for the gift they have received. Others may pick up garbage or remove invasive plant species around the tree.

ALDER – *Alnus rubra*

Red alders grow in groves, often in wet woodlands or near rivers and streams. Young trees have smooth, silvery-brown bark while older bark is often spotted with white lichen, moss, and dark patches. Leaves are dark green on top and dull grey-green below with toothed edges and sharply pointed tips. In early spring, red and yellow male flowers, called catkins, hang from leafless branches like fancy tassels and give the treetops a reddish flush. Female flowers grow on the same tree. They mature from green nubs into dark brown small cones.

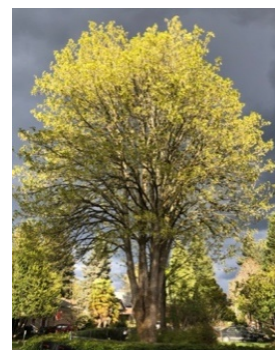


Alder bark, buds, and immature catkins are used as medicine for fighting infections and supporting digestive health. The inner bark turns a brilliant reddish-orange when cut and is used as a dye. Alder wood is used in woodworking to make many things including utensils, carvings, and furniture.

Alder is called the **community builder** because it creates a place where both plants and animals can thrive. Alder is the first to grow in places that have been devastated by landslides, fires, and clear cuts. It creates a partnership with bacteria in the soil. The bacteria gets a place to live and food from the alder in exchange for fixing nitrogen (a plant food) in the soil. This is an example of mutualism—a relationship where two species benefit from working together.

BIGLEAF MAPLE – *Acer macrophyllum*

Bigleaf maple thrives in wet forests and open fields. Young bark is green and smooth, while mature bark becomes furrowed and gray-brown in color. Older trees are often covered in mosses, lichens, and licorice ferns. Massive leaves have five tips like a hand and can grow over a foot in diameter. Flowers bloom in March through April before leaves emerge. They are greenish-yellow and hang in clusters. Each individual flower is bowl-shaped, cupping many pistils with a downy fur at their base, resembling a tiny bird nest. Fruits are shaped like wings attached in a V-shape. They emerge from the flowers looking like bunny ears popping out of a hole. Once fully developed in late summer, they travel like helicopters in the wind.



Bigleaf maple flowers are edible. You can snack on them straight, use them as a garnish on salads or soups, or add them to baked goods like pancakes. Bigleaf maple is called “paddle tree” by many Northwest tribes and has been used for basketry, house construction, cradleboards, bowls, spoons, and other implements.

Bigleaf maple is a reminder of **willingness**. It invites a community of other species to grow on its trunk and branches—demonstrating how to be with others in an open and generous way. We can also “try on” new experiences and perspectives with an open mind. Bigleaf maple also teaches us to be willing to let go—as it releases little helicoptering seeds and leaves in autumn, which blanket the forest floor. In winter, the leaves decompose and release nutrients into the soil. This process feeds the next growth of leaves and buds in spring.

COTTONWOOD – *Populus trichocarpa*

Cottonwood grows along rivers and wetlands, towering above alder and willow trees. Grey bark becomes deeply furrowed with age. Winter buds are full of fragrant yellow-to-red resin. Leaves are shiny and dark green above and silvery below. They have rounded to heart-shaped bases and finely-toothed edges. Male and female flowers grow on separate trees. Male catkins are reddish. Female catkins have light green capsules that release seeds with white, fluffy down. Cottonwood fluff flies great distances on the wind and looks like snow falling in summertime.



Cottonwood spring buds have a strong smell and can be infused in oil to make a healing oil, salve, or balm that reduces inflammation and speeds healing. Cottonwood bark tea is used to reduce fever and ease pain and inflammation. The wood is soft and lightweight when dry, and is grown in plantations to make pulp for paper because the trees grow so fast.

Cottonwood is a **wellspring** of water. A single tree has miles of roots that anchor deep in the earth, drawing massive amounts of water up to the surface. It can hold this water in its trunk and breathe it out through its leaves, thus helping to generate rain. In many cultures around the world, water is associated with our inner emotions and our spirit. Like cottonwood, we are connected to a greater source of strength.

DOUGLAS FIR – *Pseudotsuga menziesii*

Douglas fir is the second tallest tree in the world after the California redwood and can grow to be over 1,000 years old! The older bark is cinnamon-brown colored and becomes deeply furrowed, or “groovy.” The bark can grow as thick as 12 inches. The leaves are all the same length and are pointed at the tip but are not sharp. They are spirally arranged all around the branch like a bottlebrush. Limbs near the treetop sweep upward like arms reaching up toward the sky with the top of the tree pointing straight up. Seed cones are about two to three inches long and have three-pronged bracts that stick out beyond the scales, resembling the back feet and tail of a mouse.



In a common Coast Salish story, there was a great forest fire that swept through this area. All of the animals were running to escape. The poor little mice could not run fast enough so they asked the strong and tall Douglas fir for help. Douglas fir invited the mice to climb up its trunk and hide in its cones. Douglas fir has thick bark, and it was able to survive the heat of the flames. The mice are still in the cones. You see their little hind feet and tails sticking out from beneath the scales.

Douglas fir needles have a pleasant fragrance that smells like pine and citrus. The young spring tips can be eaten straight or made into a refreshing tea for promoting energy and warding off hunger and thirst. For this reason, some people call the tea “Nature’s Gatorade.” Older needles are too tough to eat but can be dried and

made into tea. Douglas fir needles can also be used on the skin because they contain vitamins and other nutrients that promote skin health and wound healing. The needles are finely chopped and infused in oil that can be made into body oil, lotion, lip balm, or salve. They can also be dried and used in baths. Douglas fir makes pitch to help fight infections and acts like a Band-Aid where the tree has been injured. You can place liquid pitch directly on wounds or insect bites to speed up healing. Pitch is also used as a fire starter, incense, and for waterproofing.

Douglas fir can **adapt**. It has been here for millions of years—adapting to extreme changes in the land, climate, and species living around it. It can take many growth forms, including a scraggly bonsai-looking tree shaped by harsh weather, and a 1,000-year-old giant with a 15-foot trunk and a tall crown surpassing 300 feet. Tough Douglas fir needles withstand cold temperatures without freezing and will hold onto water during drought. Its thick bark protects it from fires. What might help *you* to adapt to challenges in your life?

WESTERN HEMLOCK – *Tsuga heterophylla*

Hemlock grows in full shade and outlives other trees that are dependent on sunlight. It has a distinctive drooping top and feathery drooping branches. Hemlock bark is silvery brown and furrowed, but not as deeply furrowed as Douglas fir. Leaves are different lengths and are arranged randomly along branches. Cones are only an inch long. Each seed has a wing that can fly half a mile in the wind.

Hemlock spring tips are tender and delicious. Coast Salish Peoples have boiled the leaves and bark for tuberculosis, rheumatic fever, and hemorrhage. The inner bark has been used in springtime as food called “bark bread” that is high in sugars, starches, and immune stimulating properties. The bark is used to create a reddish-brown dye that makes fishnets invisible to fish. Hemlock branches are traditionally used to collect herring eggs. Many people think the hemlock tree is poisonous, but this is because it is confused with “poison hemlock,” which is an entirely different plant in the carrot family.

In a common Coast Salish story, a long time ago the Creator was giving out cones to all the evergreen conifer trees with needles. Western hemlock was not paying attention; he was playing off on his own. By the time he realized it was time to line up, he was last in line, and he got the smallest cones. He learned a powerful lesson that day. See his bent top? He still hangs his head with **humility**. Having humility means we are always learning and growing. We can acknowledge that we make mistakes and be willing to learn new perspectives and skills. Through being humble, we grow wiser and build healthy relationships with others.



GARRY OAK – *Quercus garryana*

Garry oak, or Oregon white oak, is a heavy-limbed deciduous tree with branches that are often twisted and gnarled. The bark is light gray with thick furrows and ridges. Oval-shaped leaves are shiny green on top and paler green and hairy underneath, have deep lobes, and grow alternately on stems. Garry oak grows up to 75 feet tall and often lives 200 to 500 years. It can be found in sunny locations from southern British Columbia to central California. When growing in dry, rocky slopes and coastal shores, it takes on a stunted and gnarled form. When in wetter areas like valleys, it grows into a stately tall tree with a rounded top and a large trunk.

Male and female flowers grow on the same tree. Tiny female flowers develop into acorns or nuts 2–3 cm long protected by a hard cup with a warty cap. Acorns are buried and dispersed by birds and squirrels, thus



aiding in the reproduction of oak trees. Acorns provide a nutritious meal for many animals including humans and contain carbohydrates, fat, protein, and minerals. Acorns also contain tannins, which are bitter-tasting and astringent, and must be removed from the nut meat. This is done by soaking the nut meat in water or running water through it for an extended period of time. The Chinook People of the lower Columbia River bury whole acorns in artesian springs and leave them to leach out the tannins for an entire winter. Acorns continue to be an important traditional food for Native Americans and can be ground for flour and roasted to make tea.

Unlike other trees that sprint toward the sunlight, oaks grow slowly, creating deep roots, thick bark, hard wood, tough leaves, and nutritious nuts. These patient efforts help oak to thrive in many habitats, to survive harsh conditions, to live a long life, and to support a diverse community of plants and animals. Oak's **patience** is a skill that can help teach us to endure difficult situations and to make decisions that will help us achieve long-term goals. When we get frustrated, angry, or annoyed, instead of immediately reacting with strong emotions, we can slow down and think about our long-term goals.

HAWTHORN – *Crataegus* spp.

Hawthorn is a medium-sized tree that grows around the world. Branches are armored with large thorns. Leaves are toothed and medium to dark-green colored. Flowers are small and pinkish-white and bloom in thick clusters. They smell fishy and attract pollinators including bees and flies. Berries have large seeds like cherries. The native black river hawthorn has deep green leaves and blue-black berries. European hawthorn has small, deeply-lobed leaves and red berries. Black hawthorn grows along rivers and forest edges, while European hawthorn is found in fields, forest areas, and city landscapes.



Hawthorn has many gifts. Flowers provide sweet nectar to pollinators and animals eat the nutritious berries. Large thorns protect the tree from grazing animals and offer a safe haven for small birds and other creatures to nest and hide. People value hawthorn as medicine for strengthening the heart and blood vessels. It eases pressure on the heart and can be protective in times of physical and emotional stress. Hawthorn tea has a nice flavor and can be drunk on a regular basis for general wellness.

Hawthorn medicine can soothe, strengthen, and bring **courage** when we need it. It reminds us to listen to and tend our hearts, particularly in times of distress when we might feel afraid to take another step, or to show up as we really are, not as others would like us to be. Hawthorn reminds us we are not alone and that we can listen to the kind wisdom of the heart.

WESTERN RED CEDAR – *Thuja plicata*

Cedar is a tall evergreen tree with a wide, buttressing base and a trunk with gray to cinnamon-red bark. Greenish-yellow leaves are flat with opposite scales. Branches often swoop upward at the tip in a J-shape. Simple round pollen cones appear in spring or summer and give the tree a golden appearance. Cedar seed cones have 8–12 scales, are about ½ inch long, and are shaped like rosebuds. The largest cedar trees are up to 19 feet in diameter and 200 feet tall. Some of the oldest trees are thought to be over 1,000 years old.



Cedar thrives in wet, misty forests and is very resistant to rot. The whole tree has strong aromatic compounds that fight off fungi, bacteria, and viruses. People use cedar to promote skin health, fight infections, and boost immunity. The leaves can be infused in oil and made into salves and creams,

and are also used in baths and incense. To harvest cedar leaves, gather recently fallen branches or carefully prune small fan-like branches here and there on the tree so you do not leave a visible impact. The leaves can be harvested any time of year but seem strongest in late summer to early fall when the weather is warm and aromatic oil content is the highest. The leaves can be used fresh or dried and make a great respiratory steam for colds and the flu.

In Northwest Native traditions, cedar is associated with **kindness** and **generosity**. Salish names for Western red cedar include "Long Life Giver," "Tree of Life," and "Grandmother." All parts of cedar are highly valued by Northwest Coastal Native Peoples, including the wood, bark, roots, branches, and leaves. Cedar provides many gifts to people from birth to death. The inner bark is prized for its durability, flexibility, and water resistance. Soft fibers have been used for diapers, clothing, mats, napkins, and towels. Native weavers create ornate baskets and hats from narrow strands of cedar bark. Branches and long roots are traditionally made into rope, fish traps, binding material, and baskets. Trunks are made into grand longhouses, swift and rot-resistant canoes, and art including welcome poles. Protocols (customs or cultural guidelines) for when and where to harvest, as well as how to honor cedar trees, are still practiced. What gifts do we have that we can share through kindness and generosity?

WILLOW – *Salix* spp.

Willow trees are often bushy with many stems, and a few are larger, multi-trunked trees. They are easy to miss until very early spring when new growth paints bright green and yellow hues on the winter landscape. Spring shoots tend to be straight and flexible. Buds hug the stem and grow alternate to each other. Willow leaves are simple shaped with smooth or finely toothed edges. Flowers have an upright catkin shape. Female flowers may look like pussy willow buds and mature into fuzzy seeds that are carried on the wind. Willow shoots contain a rooting hormone, allowing them to take root in wet soil.



Willows are important in water ecosystems because they stabilize stream banks and provide shade, keeping the water cool and clear for salmon and other species to thrive. Deer, elk, and moose enthusiastically graze on willow as a food source, and beavers use it for building material. Willow flowers produce pollen and nectar that bees and other insects eat.

Willow is called "nature's Aspirin" and is valued as an anti-inflammatory pain reliever, fever reducer, and bitter tonic. Its use was documented in 4,000-year-old stone tablets from ancient Sumer, and was perhaps the most important of 700 medicines mentioned in the Ebers Papyrus from Egypt in 1534 BCE. It continues to be a popular remedy around the world. Willow is prepared in several ways. For tea, the bitter-tasting bark is generally boiled or the leaves are steeped for 10-15 minutes.

Native Americans throughout the Pacific Northwest have made cordage from the inner bark of willow because it is strong and **flexible**. When gathered in spring, it is pulled apart and then twisted to make rope for fishing lines, nets, and trawl lines. Stems are made into baskets. Willow is good medicine when we are feeling stuck. It reminds us that we can be flexible during difficult times when we are resisting change. Just as willow branches bend but do not break, we can be open to new perspectives or experiences and also remain true to ourselves.