

# Making Forest Connections — Grades 9-12



## Making Forest Connections: A Correlation of the Washington Forest Education K- 12 Learning Framework with Other Educational Resources

### Grades 9-12

The Washington Forest Education K-12 Learning Framework gives educators in our forest-rich state a strong foundation for incorporating forest and natural resources in their classrooms and programs and provides a conceptual framework for teaching about Washington’s forests. This correlation document helps them further by identifying connections between each of the Washington Forest Framework’s 62 concepts and:

- [Next Generation Science Standards \(NGSS\)](#) performance expectations
- [Project Learning Tree \(PLT\)](#) activities
- [Pacific Education Institute Resources](#)
- [Project WILD](#) activities
- Other resources

### Forest Education Grades 9-12

High school students are able to apply sophisticated reasoning to difficult concepts, particularly when the learning context is familiar to them. Using forests as a context for learning is beneficial for students this age, as it provides them with a “real-world” basis for applying new knowledge. Many high school students still have difficulty proposing explanations based on logic and evidence instead of on their prior conceptions of the natural world. Providing many opportunities to collect evidence and develop explanations based on that evidence can help them develop this skill.

Forest education activities at the high school level may explore:

- What factors contribute to the biodiversity of Washington’s forests?
- How do people manage forests to achieve desired forest outcomes and ensure the sustainability of our forests?
- What role do governments, private companies and individuals play in managing Washington’s forests?
- What can individuals do to help sustain forests?

Forests can become the focus of more sophisticated research, in which students can use data to drive their decisions. Forests can also provide a meaningful context for high school students to examine the implications of issues on a variety of levels, both locally and globally.

For more information about the forest learning framework by grade level, see the Washington Forest Education K-12 Learning Framework, available at <https://pacificeducationinstitute.org>.

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## About the Resources

This document identifies connections between the Washington Forest Education Framework and the following resources for Grades 9-12.

**NGSS Performance Expectations** – NGSS standards identify expectations for what students should be able to do by the end of the year or grade band. These performance expectations also incorporate three dimensions of science: disciplinary core ideas, science and engineering practices, and cross-cutting concepts. For more information, see [www.nextgenscience.org](http://www.nextgenscience.org).

**Pacific Education Institute (PEI) Resources** – A variety of guides, lessons, and videos from PEI help to strengthen the Forest Education Framework. They provide information and learning activities to support K-12 teachers and their students in learning about forests.

- PEI Guides
- ELA Performance Tasks
- Forest of Washington Lessons
- Healthy Forests Healthy Waters Curriculum
- Project Learning Tree (PLT) extension activities
- Schoolyard Field Investigations
- Career Cards
- Solution Oriented Storylines

Resources available for download at <https://pacificeducationinstitute.org/>.

**Project Learning Tree Activities** – Relevant activities are identified from PLT's *PreK-8 Environmental Education Activity Guide* and from the *PLT's Secondary Modules*. Educators can receive these curriculum guides by participating in a PLT professional development program. For more details, contact the Pacific Education Institute.

**Project WILD Activities** – Relevant activities are identified from the *Project WILD K-12 Curriculum and Activity Guide*. Educators can receive this guide by participating in a Project WILD workshop. For more details, contact the Pacific Education Institute.

**Oregon Forest Resources Institute (OFRI) Materials** – A variety of publications and videos from OFRI help to strengthen forest literacy. They provide information and learning activities to support K-12 teachers and their students in learning about the environment.

For more information on receiving these free resources go to: [learnforests.org](http://learnforests.org).

## Acknowledgements

This correlation was supported by a Project Learning Tree Model Program Initiative grant from the Sustainable Forestry Initiative. We appreciate the hard work of the Oregon Forest Resources Institute (OFRI) to create such valuable forest education resources and their generosity in sharing them with others to adapt and use. Thank you to Pat Otto, former PLT WA State Coordinator and PEI Education Manager for adapting these correlations for use by Washington educators. Her forest education expertise and work to create locally relevant materials is an invaluable resource and we are grateful.

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Theme 1: What is a Forest?					
Washington Forest Education Framework	NGSS Performance Expectations	Project Learning Tree Activities	PEI Resources	Project WILD Activities	Additional Resources
<p style="text-align: center;"><b>Definition of a Forest</b></p> <ol style="list-style-type: none"> <li>1. Forests are ecosystems characterized by a dominance of tree cover and the presence of a wide variety of other organisms (e.g., other plants and animals).</li> <li>2. Forests are comprised of trees that may differ in species, age and size, and are affected by biotic factors (e.g., plants, animals and humans) and abiotic factors (e.g., soils, nutrients, moisture, sunlight and climate).</li> <li>3. Urban forests include all the publicly and privately owned trees within a city, town, or suburb working together as an ecosystem.</li> <li>4. Trees compete with each other and with other plants growing near them for nutrients, sunlight, space and water.</li> <li>5. The health and wellness of trees in a forest ecosystem depend on and are affected by many factors.</li> </ol>		<p><b>Focus on Forests</b></p> <ol style="list-style-type: none"> <li>1: Monitoring Forest Health</li> <li>7: Forest Invaders</li> </ol> <p><b>Forests of the World</b></p> <ol style="list-style-type: none"> <li>2: What Is a Forest?</li> <li>3: Mapping the World's Forests</li> <li>4: Analyzing Patterns of Forest Change</li> </ol>	<p><b>Forests of Washington Ecosystems</b></p> <ol style="list-style-type: none"> <li>1. There's no Place Like Home</li> <li>2. Getting to know the Trees of Washington</li> <li>3. Here's Looking at Yew</li> <li>4. Forest Homes</li> </ol> <p><b>ELA Performance Tasks</b></p> <p>Bioblitz Invasive Species</p> <p><b>Guides</b></p> <p>Field Investigations FieldDesign: Engineering Design for Field-Based Applications 6-12 Schoolyard Biodiversity</p> <p><b>Curriculum</b></p> <p>Healthy Forests, Healthy Waters</p> <p><b>WA CTE Framework: Forest Management</b></p> <p><b>PLT Extensions</b> <a href="http://www.pltwa.com">www.pltwa.com</a> Trees as Habitat and Tree Benefits Tree Abundance Field Investigation</p>	<p>What's That Habitat?</p> <p>Map that Habitat Forest in a Jar</p> <p>Time Lapse</p> <p>Raindrops and Ranges</p> <p>Bottleneck Genes</p>	<p><b>OFRI</b></p> <p>Forest Essays Grade 7-12</p> <p><b>Forest Fact Breaks:</b></p> <p>Ecosystems Tree Biology</p> <p><b>Forest Fact Sheets:</b></p> <p>Woody Biomass</p> <p><b>Inside Oregon's Forests:</b> A High School Forestry Curriculum</p>

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Washington Forest Education Framework	NGSS Performance Expectations	Project Learning Tree Activities	PEI Resources	Project WILD Activities	Additional Resources
<p><b>Trees as Part of the Forest</b></p> <ol style="list-style-type: none"> <li>1. A tree is a woody perennial plant usually 12 feet or more (4 meters or more) tall, with a single main stem and a more or less distinct crown of leaves or needles.</li> <li>2. Trees have life stages that include germination, growth, maturity, reproduction, decline and death.</li> <li>3. As part of the forest ecosystem, trees have various roles (e.g., supplying oxygen, providing habitat, holding soil, moderating temperature, capturing, and storing carbon, and cycling water and nutrients).</li> <li>4. Trees compete with each other and with other plants growing near them for nutrients, sunlight, space and water.</li> <li>5. The health and wellness of trees in a forest ecosystem depend on and are affected by many factors.</li> </ol>	<p>(Somewhat relevant)</p> <p>HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.</p> <p>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.</p> <p>HS-LS2-1. Use mathematical and/or computational representations to support explanations for factors that affect carrying capacity of ecosystems at different scales.</p> <p>HS-LS2-1. Use mathematical and/or computational representations to support explanations for factors that affect carrying capacity of ecosystems at different scales.</p>	<p><b>Focus on Forests</b></p> <ol style="list-style-type: none"> <li>1: Monitoring Forest Health</li> <li>4: Tough Choices</li> <li>6: Forest to Faucet</li> <li>8: Climate Change and Forests</li> </ol> <p><b>Forests of the World</b></p> <ol style="list-style-type: none"> <li>6: Seeking Sustainability: A Global Response</li> <li>7: Exploring the World Marketplace</li> </ol> <p><b>Southeastern Forests and Climate</b></p> <ol style="list-style-type: none"> <li>1: Stepping Through Climate Science</li> <li>3: Atlas of Change</li> <li>8: Counting Carbon</li> </ol>	<p><b>Forests of Washington Ecosystems</b></p> <ol style="list-style-type: none"> <li>1. There’s no Place Like Home</li> <li>2. Getting to know the Trees of Washington</li> <li>4. Forest Homes</li> </ol> <p><b>ELA Performance Tasks</b></p> <p>Bioblitz Forest Benefits Climate Change, Carbon, and Trees</p> <p><b>Guides</b></p> <p>Field Investigations FieldDesign: Engineering Design for Field-Based Applications 6-12 Fostering Outdoor Observation Skills</p> <p><b>Curriculum</b></p> <p>Healthy Forests, Healthy Waters</p> <p><b>Solutions-Oriented Learning Storyline HS- Forests: Carbon Sequestration</b></p> <p><b>WA CTE Framework: Forest Management</b></p> <p><b>PLT Extensions <a href="http://www.pltwa.com">www.pltwa.com</a></b></p> <p>Every Tree for Itself Cards Tree Cookies Forest Benefits student page Leaf as a System Trees as Habitat and Tree Benefits Tree Abundance Field Investigation</p>	<p>Environmental Barometer</p> <p>Phenology at Play</p>	<p><b>OFRI</b></p> <p>Forest Essays, Grades 7-12</p> <p><b>Forest Fact Breaks:</b></p> <p>Tree Biology Carbon Capture Ecosystems Sustainability Water Woody Biomass</p> <p><b>Inquiry at Hinkle Creek</b></p> <p><b>Inside Oregon's Forests: A High School Forestry Curriculum</b></p> <p><b>Other</b></p> <p>I-Tree: Tree Benefits <a href="http://www.treebenefits.com">www.treebenefits.com</a></p> <p><a href="http://www.budburst.org">www.budburst.org</a> -for Investigations in the forest</p>

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<p style="text-align: center;"><b>Forests as Ecosystems</b></p> <p>1. Forest ecosystems consist of different types of organisms (e.g. producers, consumers, and decomposers) and nonliving components (e.g. sunlight, soil, minerals, and water) interacting within a given environment, space, and time.</p> <p>2. Humans depend on and influence forest ecosystems and are themselves influenced by forest ecosystems.</p> <p>3. Forest ecosystems include processes such as photosynthesis, energy flow and the cycling of nutrients, water, carbon, and other matter.</p> <p>4. Forest ecosystems are complex and dynamic, and continuously undergo change or adaptation, ranging from gradual change (e.g., succession and climate) to abrupt change (e.g., fire and disease).</p> <p>5. Natural and human-caused disturbance events are a part of forest ecosystems. Examples of natural events are wind and volcanic activity, and examples of human-caused events are logging, road construction and development. Wildfire is a disturbance that can be both natural and human-caused.</p> <p>6. Forests are interconnected with other terrestrial (e.g., rangeland) and aquatic (e.g., estuary) ecosystems, forming a larger system.</p> <p>7. Washington’s regions vary in soil types, elevation, temperature, wind, and rainfall patterns. These variations create the different forest types and residents (plants and animals) that, together with disturbance histories, contribute to that region’s biodiversity.</p>	<p>HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.</p> <p>HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.</p> <p>HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.</p> <p>HS-LS2-6. Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions but changing conditions may result in a new ecosystem.</p> <p>HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</p>	<p><b>Focus on Forests</b></p> <p>1: Monitoring Forest Health 2: Story of Succession 5: The Nature of Fire 6: Forest to Faucet 7: Forest Invaders 8: Climate Change and Forests</p> <p><b>Forests of the World</b></p> <p>1: Making the Global Connection 2: What Is a Forest? 3: Mapping the World's Forests 4: Analyzing Patterns of Forest Change 5: Understanding the Effects of Forest Uses 6: Seeking Sustainability: A Global Response 9: Researching Forests of the World</p> <p><b>Southeastern Forests and Climate</b></p> <p>1: Stepping Through Climate Science 3: Atlas of Change 4: The Changing Forests 8: Counting Carbon</p>	<p><b>Forests of Washington Ecosystems</b></p> <p>1. There’s no Place Like Home 2. Getting to know the Trees of Washington 3. Here’s Looking at Yew 4. Forest Homes 5. Come Grow with Us 6. Washington Forest Eco-Connections 7. Fire: Friend or Foe 8: The Forest Flu 9: Weather Waltzes with the Forest</p> <p><b>ELA Performance Tasks</b></p> <p>Bioblitz Climate Change Carbon and Trees Forest Management</p> <p><b>Guides</b></p> <p>Field Investigations FieldDesign: Engineering Design for Field-Based Applications 6-12 Photo Point Monitoring Schoolyard Biodiversity</p> <p><b>Curriculum</b></p> <p>Healthy Forests, Healthy Waters</p> <p><b>WA CTE Framework: Forest Management</b></p> <p><b>PLT Extensions</b> <a href="http://www.pltwa.com">www.pltwa.com</a> Forest Benefits student page Trees as Habitat and Tree Benefits Leaf as a System Tree Abundance Field Investigation Temperature investigation journal Rainfall investigation Habitat diversity field investigations</p>	<p>Birds of Prey</p> <p>Forest in a Jar</p> <p>Fire Ecologies</p> <p>Bottleneck Genes</p> <p>Oh Deer!</p> <p>Urban Nature Search</p> <p>Raindrops and Ranges</p> <p>Time Lapse</p> <p>Environmental Barometer</p> <p>Eco-enrichers</p>	<p><b>OFRI</b></p> <p>Forest Essays, Grades 7-12</p> <p><b>Forest Fact Breaks:</b></p> <p>Tree Biology Carbon Capture Photosynthesis Water Fire Fire Safety Forest Types</p> <p><b>Forest Fact Sheets:</b></p> <p>Carbon &amp; Climate Drinking Water Photosynthesis Fire Where's All the Carbon? (carbon cycle poster) <b>Inquiry</b> at Hinkle Creek <b>Oregon's Forests</b> (poster) <b>Inside Oregon's Forests:</b> A High School Forestry Curriculum</p>

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<p style="text-align: center;"><b>Forest Classification</b></p> <p>1. Trees can be identified by their leaves, seeds, cones, flowers, fruits, and other characteristics. Trees can be classified into family, genus and species groups based on their reproductive parts and/or genetics.</p> <p>2. Different forest biomes exist around the world. Examples include tropical forests, temperate forests, and boreal forests. Washington is in the temperate forest biome.</p> <p>3. Many different forest types exist within a biome, typically named by their dominant tree species. Common forest types in Washington include spruce-hemlock, Douglas-fir, ponderosa pine, mixed conifer, and hardwood.</p>	<p>HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations</p> <p>HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.</p>	<p><b>PLT PreK-8 Guide</b> 29: Rain Reasons 64: Looking at Leaves 68: Name that Tree</p> <p><b>Focus on Forests</b> 7: Forest Invaders</p> <p><b>Forests of the World</b> 3: Mapping the World's Forests</p> <p><b>Southeastern Forests and Climate</b> 6: Mapping Seed Sources</p>	<p><b>Forests of Washington Ecosystems</b> 1. There's no Place Like Home 2. Getting to know the Trees of Washington 4. Forest Homes 5. Come Grow with Us 6. Washington Forest Eco-connections</p> <p><b>PLT Extensions</b> <a href="http://www.pltwa.com">www.pltwa.com</a> Habitat diversity field investigation Tree abundance field investigation</p> <p><b>WA CTE Framework: Forest Management</b></p>	<p>Raindrops and Ranges</p> <p>Time Lapse</p>	<p><b>OFRI</b> <b>Forest Fact Break:</b> Forest Types <b>Inside Oregon's Forests:</b> A High School Forestry Curriculum <b>Oregon's Forests</b> (poster)</p> <p><b>Other</b> <a href="http://www.budburst.org">www.budburst.org</a> -for Investigations in the forest</p>

### Theme 2: Why are Forests Important?

<p style="text-align: center;"><b>Historical Importance</b></p> <p>1. Today, as in the past, forest continue to play a significant cultural, spiritual, and economic role in Native American Societies.</p> <p>2. In Washington 's development toward becoming a state, forests provided basic resources for Native Americans and settlers, jobs for a growing workforce, resources for building the nation and dollars for a new state economy.</p> <p>3. As multiple demands on forests increased, the practice of forest management evolved to conserve and preserve natural resources and to improve society's use of forestlands. It incorporated scientific principles and an understanding of competing interests.</p> <p>4. Historical perspectives, which may include aesthetic, cultural, spiritual, economic, and educational factors, form our understanding of forests and our personal connections to forests, and guide decisions to ensure forests for future generations.</p>	<p>HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.</p> <p>HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.</p>	<p><b>Focus on Forests</b> 9: Words to Live By</p> <p><b>Forests of the World</b> 2: What Is a Forest?</p> <p><b>Southeastern Forests and Climate</b> 1: Stepping through Climate Change 4: The Changing Forests 5: Managing Forests for Change 12: The Carbon Puzzle</p>	<p><b>Forests of Washington Ecosystems</b> 13. Who Manages Washington's Forests? 14. Where There's a Will There's a Way 21. A Forest Full of Views</p>	<p>Deer Dilemma</p> <p>A Picture Is Worth a Thousand Words</p>	<p><b>OFRI</b> Forest Essays, Grades 7-12 <b>Inside Oregon's Forests:</b> A High School Forestry Curriculum</p>
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Washington Forest Education Framework	NGSS Performance Expectations	Project Learning Tree Activities	PEI Resources	Project WILD Activities	Additional Resources
<p><b>Environmental Importance</b></p> <ol style="list-style-type: none"> <li>1. Forests affect air, water, and soil quality.</li> <li>2. Forests provide habitat for fish and wildlife.</li> <li>3. Forests provide the opportunity to study ecosystems, conservation, and natural resource management.</li> <li>4. Forests sequester carbon from the atmosphere and are an essential component of the global carbon cycle. Forest products made from wood also store carbon.</li> <li>5. Washington 's forests are important ecological systems, interconnected with other systems not only environmentally, but socially and economically. Changes in the conditions and uses of Washington 's forests may affect the conditions and uses of forests worldwide.</li> </ol>	<p>HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.</p> <p>HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.</p> <p>HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem</p>	<p><b>Focus on Forests</b></p> <ol style="list-style-type: none"> <li>1: Monitoring Forest Health</li> <li>6: Forest to Faucet</li> <li>7: Forest Invaders</li> <li>8: Climate Change and Forests</li> </ol> <p><b>Forests of the World</b></p> <ol style="list-style-type: none"> <li>4: Analyzing Patterns of Forest Change</li> <li>5: Understanding the Effects of Forest Uses</li> <li>6: Seeking Sustainability: A Global Response</li> <li>7: Exploring the World Marketplace</li> <li>8: Making Consumer Choices</li> <li>9: Researching Forests of the World</li> </ol> <p><b>Southeastern Forests and Climate</b></p> <ol style="list-style-type: none"> <li>1: Stepping through Climate Change</li> <li>4: The Changing Forests</li> <li>5: Managing Forests for Change</li> <li>7: Carbon on the Move</li> <li>8: Counting Carbon</li> <li>12: The Carbon Puzzle</li> </ol> <p><b>Green Jobs: Exploring Forest Careers</b></p>	<p><b>Forests of Washington Ecosystems</b></p> <ol style="list-style-type: none"> <li>3. Here's Looking at Yew</li> <li>4. Forest Homes</li> <li>5. Come Grow with Us</li> <li>6. Washington Forest Eco-connections</li> <li>19. Town Trees</li> </ol> <p><b>ELA Performance Tasks</b></p> <p>Forest Management 6-8 Renewable Energy: Biomass Climate Change, Carbon, and Trees Summer in the City: Urban Heat Islands Invasive Species</p> <p><b>Guides</b></p> <p>Field Investigations FieldDesign: Engineering Design for Field-Based Applications 6-12 Fostering Outdoor Observation Skills Landscape Investigations</p> <p><b>Career Profile Cards</b></p> <p><b>Solutions-Oriented Learning Storyline MS-</b> Forests: Carbon Sequestration</p> <p><b>Curriculum</b></p> <p>Heathy Forests, Healthy Waters Drain Rangers</p> <p><b>WA CTE Framework: Forest Management</b></p>	<p>Map that Habitat</p> <p>Graphanimal</p> <p>Eco-Enrichers</p> <p>Environmental Barometer</p>	<p><b>OFRI</b></p> <p>Forest Essays, Grades 7-12</p> <p><b>Forest Fact Breaks:</b></p> <p>Water Wildlife Carbon Capture</p> <p><b>Forest Fact Sheets:</b></p> <p>Wildlife Drinking Water Woody Biomass Carbon &amp; Climate</p> <p><b>Where's All the Carbon?</b> (carbon cycle poster)</p> <p><b>Oregon Forest Facts &amp; Figures Inquiry</b> at Hinkle Creek (video)</p> <p><b>Inside Oregon's Forests:</b> A High School Forestry Curriculum</p> <p><b>Other</b></p> <p>I-Tree: Tree Benefits <a href="http://www.treebenefits.com">www.treebenefits.com</a></p>
<p><b>Social Importance</b></p> <ol style="list-style-type: none"> <li>1. Washington 's forests provide basic resources that people use every day.</li> <li>2. Individuals hold different values concerning forests and their use, based on their experience and connection with the forest.</li> <li>3. Forests influence the economic, social and cultural composition of both urban and rural communities</li> </ol>		<p><b>Focus on Forests</b></p> <ol style="list-style-type: none"> <li>5: The Nature of Fire</li> <li>9: Words to Live By</li> </ol> <p><b>Forests of the World</b></p> <ol style="list-style-type: none"> <li>1: Making the Global Connection</li> <li>2: What Is a Forest?</li> <li>7: Exploring the World Marketplace</li> <li>9: Researching Forests of the World</li> </ol>	<p><b>Forests of Washington Ecosystems</b> <sup>4</sup></p> <ol style="list-style-type: none"> <li>11. Watershed Benefits</li> <li>19. Town Trees</li> </ol> <p><b>ELA Performance Tasks</b></p> <p>Forest Management 6-8 Climate, Carbon, and Trees Summer in the City: Urban Heat Islands</p> <p><b>WA CTE Framework: Forest Management</b></p>	<p>Deer Dilemma</p> <p>Migration Barriers Nature in Art</p> <p>Natural Dilemmas</p>	<p><b>OFRI</b><sup>3</sup></p> <p>Forest Essays, Grades 7-12</p> <p><b>Forest Fact Sheets:</b></p> <p>Forests Oregon Forest Facts &amp; Figures</p> <p><b>Inside Oregon's Forests:</b> A High School Forestry Curriculum</p>



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<p style="text-align: center;"><b>Economic Importance</b></p> <p>1. Forests provide multiple economic benefits, including jobs and forest products; renewable energy and minerals; financial returns to owners and investors; and ecosystem service benefits such as carbon storage, clean water, recreation, and tourism.</p> <p>2. Forests provide income for local, state, national, and international economies. Washington’s forest sector is one of the state’s largest economic sectors and provides critical resources and products to the global marketplace, including softwood lumber, plywood, and engineered wood products.</p> <p>3. Forest products are an important component of Washington’s “green” economy. They come from a renewable resource and store carbon, and most are also reusable and recyclable.</p> <p>4. Economic returns to forest landowners are important in preventing the loss of forests to other non-forest land uses.</p>	<p>HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.</p>	<p><b>Focus on Forests</b></p> <p>1: Monitoring Forest Health 3: Who Owns America’s Forests? 6: Forest to Faucet 8: Climate Change and Forests</p> <p><b>Forests of the World</b></p> <p>1: Making the Global Connection 5: Understanding the Effects of Forest Uses 6: Seeking Sustainability: A Global Response 7: Exploring the World Marketplace 8: Making Consumer Choices 9: Researching Forests of the World</p> <p><b>Southeastern Forests and Climate</b></p> <p>1: Stepping through Climate Change 2: Clearing the Air 4: The Changing Forests 5: Managing Forests for Change 8: Counting Carbon 9: The Real Cost 10: Adventures in Life Cycles Assessment 11: Life Cycle Assessment Debate 12: The Carbon Puzzle</p> <p><b>Green Jobs: Exploring Forest Careers</b></p>	<p><b>Forests of Washington Ecosystems</b></p> <p>11. Watershed Benefits 13. Who Manages Washington’s Forests? 14. Where There’s a Will There’s a Way 16. Tree Uses 21. A Forest Full of Views</p> <p><b>ELA Performance Tasks</b></p> <p>Forest Management 6-8 Stormwater Pollution Renewable and Non-Renewable Energy Renewable Energy: Biomass Climate Change, Carbon, and Trees Summer in the City: Urban Heat Islands</p> <p><b>Guides</b></p> <p>Landscape Investigation</p> <p><b>Career Profile Cards</b></p> <p><b>Solutions-Oriented Learning Storyline HS-</b> Forests: Carbon Sequestration</p> <p><b>Curriculum</b></p> <p>Healthy Forests, Healthy Waters</p> <p><b>WA CTE Framework: Forest Management</b></p>	<p>Natural Dilemmas</p>	<p><b>OFRI</b></p> <p>Find Your Path Find Your Path videos Forest Essays, Grades 7-12</p> <p><b>Forest Fact Breaks:</b></p> <p>Carbon Capture Green Building Wood Products</p> <p><b>Forest Fact Sheets:</b></p> <p>Forests Carbon &amp; Climate Drinking Water</p> <p><b>Where’s All the Carbon?</b> (carbon cycle poster)</p> <p><b>Inquiry</b> at Hinkle Creek (video)</p> <p><b>Oregon Forest Facts &amp; Figures</b></p> <p><b>Inside Oregon’s Forests:</b> A High School Forestry Curriculum</p> <p><b>Other</b></p> <p>I-Tree: Tree Benefits <a href="http://www.treebenefits.com">www.treebenefits.com</a></p>



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## Theme 3: How Do We Sustain Our Forests?

Washington Forest Education Framework	NGSS Performance Expectations	Project Learning Tree Activities	PEI Resources	Project WILD Activities	Additional Resources
<p style="text-align: center;"><b>Forest Ownership</b></p> <p>1. The size and scale of forest ownership can vary from hundreds of thousands of acres in a national forest to an individual patch of trees in an urban forest.</p> <p>2. Washington’s forests are managed under private (e.g., family and industrial) and public (e.g., state and federal) ownership. Each type of ownership may have different management objectives and may be subject to different laws and policies.</p> <p>3. Forestlands– as well as fire and other disturbances that affect them – cross natural boundaries, such as watersheds, and administrative boundaries, such as city limits and private property lines.</p> <p>4. Many forest landscapes are made up of a variety of ownerships, a mix of management objectives, and a blend of forest ecosystems.</p>		<p><b>Focus on Forests</b> 3: Who Owns America's Forests? 5: The Nature of Fire 6: Forest to Faucet</p> <p><b>Forests of the World</b> 3: Mapping the World's Forests</p>	<p><b>Forests of Washington Ecosystems</b> 7. Fire: Friend or Foe? 13. Who Manages Washington’s Forests? 14. Where There’s a Will There’s a Way 18. Let’s Make a Deal 19. Town Trees 21. A Forest Full of Views</p> <p><b>Career Profile Cards</b></p> <p><b>WA CTE Framework: Forest Management</b></p>	Wild Bill’s Fate	<p><b>OFRI</b> <b>Forest Fact Sheet:</b> Ownership <b>Oregon Forest Facts &amp; Figures</b> <b>Forest Fact Breaks:</b> Fire Safety <b>Inquiry at Hinkle Creek</b> (video)</p>
<p style="text-align: center;"><b>Forest Management</b></p> <p>1. Forest management is a long- term process that can lead to changes in tree species composition, size, and age, as well as in forest health and resilience.</p> <p>2. Forest management ranges from active management (e.g., planting, thinning, and harvesting) to passive management (e.g., set- asides and wilderness areas) to grow, restore, maintain, conserve, or alter forests.</p> <p>3. Forest management includes the use of natural processes and goal-oriented decisions and actions to achieve a variety of desired outcomes, including ecological (e.g., improving wildlife habitat), economic (e.g., timber production), and social (e.g., recreation) outcomes. Many of these outcomes are interrelated and can be managed for simultaneously, while others may be incompatible.</p> <p>4. In Washington, forest management in private and state forests is regulated by the Washington Forest Practices Act,</p>	<p>HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</p> <p>HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.</p> <p>HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.</p>	<p><b>Focus on Forests</b> 2: Story of Succession</p> <p><b>Forests of the World</b> 1: Making the Global Connection 4: Analyzing Patterns of Forest Change 6: Seeking Sustainability: A Global Response 7: Exploring the World Marketplace 9: Researching Forests of the World</p> <p><b>Southeastern Forests and Climate</b> 1: Stepping through Climate Change 2: Clearing the Air 3: Atlas of Change 4: The Changing Forests 5: Managing Forests for Change 8: Counting Carbon 12: The Carbon Puzzle</p>	<p><b>Forests of Washington Ecosystems</b> 7. Fire: Friend or Foe? 8. The Forest Flu 9. Weather Waltzes with the Forest 13. Who Manages Washington’s Forests? 14. Where There’s a Will There’s a Way 18. Let’s Make a New Deal 19. Town Trees 21. A Forest Full of Views</p> <p><b>ELA Performance Tasks</b> Forest Benefits Forest Management Stormwater Pollution Summer in the City: Urban Heat Islands Invasive Plants Climate Change, Carbon, and Trees</p> <p><b>Guides</b> Field Investigations</p>	Bat Blitz  Time Lapse  Ecosystem Architects  Deer Dilemma  Migration Barriers  A Picture is Worth a Thousand Words  Natural Dilemmas  Sustainability: Then. Now. Later.	<p><b>OFRI</b> Forest Essays, Grades 7-12 <b>Forest Fact Breaks:</b> Forest Management Clearcutting Reforestation Sustainability Water <b>Inquiry at Hinkle Creek</b> (video) <b>Forest Fact Sheets:</b> Clearcutting Forests Reforestation Drinking Water Protection Laws <b>Oregon Forest Facts &amp; Figures</b> <b>Inside Oregon's Forests: A High School Forestry Curriculum</b></p> <p><b>Other</b> I-Tree: Tree Benefits <a href="http://www.treebenefits.com">www.treebenefits.com</a></p>

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<p>which aims to sustain forest land for timber production and the other benefits forests provide, including clean water, wildlife habitat, and recreation.</p> <p>5. As human populations and global demand for forest resources increase, forest management and advances in research and technological systems can help to ensure forest resources are maintained or improved to produce the desired values and products.</p>		<p><b>Green Jobs: Exploring Forest Careers</b></p>	<p>Schoolyard Biodiversity</p> <p><b>Curriculum</b> Healthy Forests, Healthy Waters</p> <p><b>Solutions-Oriented Learning Storyline HS-</b> Forests: Carbon Sequestration</p> <p><b>Career Profile Cards</b></p> <p><b>WA CTE Framework: Forest Management</b></p>		
Washington Forest Education Framework	NGSS Performance Expectations	Project Learning Tree Activities	PEI Resources	Project WILD Activities	Additional Resources
<p><b>Forest Management Decisions</b></p> <p>1. A variety of individuals, companies, organizations, and government agencies manage forests. Forest management decisions may involve some or all of these working collaboratively to ensure mutually beneficial outcomes.</p> <p>2. Forest resource professionals aim to meet individual, societal and environmental needs.</p> <p>3. The type and intensity of forest management is dependent on the purposes for which the forest is managed, as well as forest type, ownership, size, and location.</p> <p>4. Washington foresters and forest managers prepare forest management plans based on landowner goals and objectives, capabilities of the forest site, laws, and available tools (e.g., planting, harvesting, and using prescribed fire).</p> <p>5. The public empowers governments to conserve, maintain and sustain forest resources by enacting laws, creating policies, establishing agencies, creating public lands and providing management guidelines and continuing education for forest landowners.</p> <p>6. Government has a role in actively engaging organizations, businesses, communities and individuals in forest management and policy decisions,</p>	<p>HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.</p>	<p><b>Focus on Forests</b></p> <p>1: Monitoring Forest Health 3: Who Owns America's Forests? 4: Tough Choices 5: The Nature of Fire 7: Forest Invaders</p> <p><b>Forests of the World</b></p> <p>6: Seeking Sustainability: A Global Response 7: Exploring the World Marketplace</p> <p><b>Southeastern Forests and Climate</b></p> <p>1: Stepping through Climate Change 2: Clearing the Air 3: Atlas of Change 4: The Changing Forests 5: Managing Forests for Change 8: Counting Carbon 12: The Carbon Puzzle 13: Future of Our Forests</p> <p><b>Green Jobs: Exploring Forest Careers</b></p>	<p><b>Forests of Washington Ecosystems</b></p> <p>7. Fire: Friend or Foe? 8. The Forest Flu 9. Weather Waltzes with the Forest 13. Who Manages Washington's Forests? 14. Where There's a Will There's a Way 18. Let's Make a New Deal 19. Town Trees 21. A Forest Full of Views</p> <p><b>ELA Performance Tasks</b></p> <p>Forest Benefits Forest Management Stormwater Pollution Summer in the City: Urban Heat Islands Invasive Plants Climate Change, Carbon, and Trees</p> <p><b>Career Profile Cards</b></p> <p><b>Solutions-Oriented Learning Storyline MS:</b> Forests: Carbon Sequestration</p> <p><b>Curriculum</b> Healthy Forests, Healthy Waters</p> <p><b>WA CTE Framework: Forest Management</b></p>	<p>Deer Dilemma</p> <p>Wild Bill's Fate</p> <p>Bird Song Survey</p> <p>A Picture Is Worth a Thousand Words</p> <p>Migration Barriers</p> <p>Ecosystem Architects</p> <p>Natural Dilemmas</p> <p>Sustainability: Then. Now. Later.</p>	<p><b>OFRI</b></p> <p>Find Your Path Find Your Path videos <b>Forest Fact Breaks:</b> Clearcutting Fire Sustainability <b>Forest Fact Sheets:</b> Clearcutting Fire Protection Laws Sustainability <b>Inquiry at Hinkle Creek</b> (video) <b>Inside Oregon's Forests:</b> A High School Forestry Curriculum</p> <p><b>Other</b></p> <p>I-Tree: Tree Benefits <a href="http://www.treebenefits.com">www.treebenefits.com</a></p>

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<p>especially for publicly owned forests.</p> <p>7. Sustainable management of forests takes into account social, economic and ecological dimensions of sustainability. It includes maintaining forest health, productivity and diversity, and conserving a forested land base for the needs of present and future generations.</p> <p>8. Changing public demands and expectations for the forest, as well as unanticipated events, affect decisions about forest resource use. Sound management based on scientific research, economic analysis and public involvement is required.</p>					
Washington Forest Education Framework	NGSS Performance Expectations	Project Learning Tree Activities	PEI Resources	Project WILD Activities	Additional Resources
<p><b>Forest Management Perspectives</b></p> <ol style="list-style-type: none"> <li>1. People have differing perspectives about forest management, which can be affected by politics, science, economics, values, perception, and experience.</li> <li>2. Forest management can be controversial because of diverse perspectives as well as the complex nature of forest ecosystems.</li> <li>3. Issues related to forest management include the effects of timber harvest, carbon sequestration and climate change, forest land uses, wildfire, and others.</li> <li>4. Involving multiple perspectives in decision-making, especially with regard to Washington’s public forests, can lead to more effective problem-solving and result in more sustainable outcomes for Washington’s forests.</li> </ol>	<p>HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.</p> <p>HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</p> <p>HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.</p>	<p><b>Focus on Forests</b></p> <p>4: Tough Choices 9: Words to Live By 5: The Nature of Fire 8: Climate Change and Forests</p> <p><b>Forests of the World</b></p> <p>1: Making the Global Connection 2: What Is a Forest? 5: Understanding the Effects of Forest Uses 7: Exploring the World Marketplace</p> <p><b>Southeastern Forests and Climate</b></p> <p>1: Stepping through Climate Change 2: Clearing the Air 3: Atlas of Change 4: The Changing Forests 5: Managing Forests for Change 8: Counting Carbon 12: The Carbon Puzzle 13: Future of Our Forests</p> <p><b>Green Jobs: Exploring Forest Careers</b></p>	<p><b>Forests of Washington Ecosystems</b></p> <p>7. Fire: Friend or Foe? 8. The Forest Flu 9. Weather Waltzes with the Forest 13. Who Manages Washington’s Forests? 14. Where There’s a Will There’s a Way 18. Let’s Make a New Deal 19. Town Trees 21. A Forest Full of Views</p> <p><b>ELA Performance Tasks</b></p> <p>Forest Management Stormwater Pollution Summer in the City: Urban Heat Islands Invasive Plants Climate Change, Carbon, and Trees</p> <p><b>Career Profile Cards</b></p> <p><b>Guides:</b> FieldDesign: Engineering Design for Field-Based Applications 6-12 Project Based Learning Model</p> <p><b>WA CTE Framework: Forest Management</b></p>	<p>Back from the Brink</p> <p>Wildlife and the Environment: Community Survey</p> <p>Deer Dilemma</p> <p>Fire Ecology</p> <p>Changing the Land</p> <p>Phenology at Play</p> <p>To Zone or Not to Zone</p> <p>Natural Dilemmas (adapt)</p> <p>Sustainability: Then. Now. Later.</p> <p>Changing the Land</p>	<p><b>OFRI</b></p> <p><b>Forest Fact Breaks:</b> Clearcutting</p> <p><b>Forest Fact Sheets:</b> Carbon &amp; Climate Clearcutting</p> <p><b>Inside Oregon’s Forests: A High School Forestry Curriculum</b></p> <p><b>Other</b></p> <p>I-Tree: Tree Benefits <a href="http://www.treebenefits.com">www.treebenefits.com</a></p> <p><a href="http://www.rainforest-alliance.org/curricula/carbon">Rainforest Alliance Carbon Curriculum</a> <a href="https://www.rainforest-alliance.org/curricula/climate">https://www.rainforest-alliance.org/curricula/climate</a></p>

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### Theme 4: What is Our Responsibility to Washington Forests?

Washington Forest Education Framework	NGSS Performance Expectations	Project Learning Tree Activities	PEI Resources	Project WILD Activities	Additional Resources
<p><b>Our Connection to Washington’s Forests</b></p> <p>1. Everyone should have the opportunity to identify and explore their personal connection with forests.</p> <p>2. Resources we use and consume every day are connected to Washington’s forests.</p> <p>3. There are many ways that individuals can connect with forests in Washington, including hiking and picnicking in forests, volunteering for projects in and around forests, becoming informed and active voters, attending public meetings, and making wise consumer choices.</p>		<p><b>Forests of the World</b></p> <p>5: Understanding the Effects of Forest Uses</p> <p>8: Making Consumer Choices</p>	<p><b>Forests of Washington Ecosystems</b></p> <p>1. There’s no Place Like Home</p> <p>2. Getting to know the Trees of Washington</p> <p>3. Here’s Looking at Yew</p> <p>4. Forest Homes</p> <p>5. Come Grow with Us</p> <p>6. Washington Forest Eco-Connections</p> <p>11. Watershed Benefits</p> <p>15. Less is More</p> <p>16. Tree Uses</p> <p>17. Wood You Make a Difference?</p> <p><b>ELA Performance Tasks</b></p> <p>Forest Benefits</p> <p>Summer in the City: Urban Heat Islands</p> <p><b>Guides</b></p> <p>Field Investigations</p> <p>Project Based Learning Model</p> <p>Fostering Outdoor Observation Skills</p> <p>Photo Point Monitoring</p> <p>FieldDesign: Engineering Design for Field-Based Applications 6-12</p> <p><b>PLT Extensions</b> <a href="http://www.pltwa.com">www.pltwa.com</a></p> <p>Trees as Habitat and Tree Benefits</p> <p><b>Curriculum</b></p> <p>Healthy Forests, Healthy Waters</p>	<p>Animal Poetry</p> <p>Learning to Look, Looking to See</p> <p>Nature in Art</p> <p>Graphanimal</p> <p>Urban Nature Search (adapt to forests)</p> <p>Eco-Enrichers</p>	<p><b>OFRI</b></p> <p>Forest Essays, Grades 7-12</p> <p><b>Other</b></p> <p><i>The Truth about Science: A Curriculum for Developing Young Scientists</i>, by Kathryn Kelsey and Ashley Steel. NSTA Press</p> <p><i>Citizen Science: 15 Lesson that Bring Biology to Life</i>, 6-12 -NSTA Press</p> <p><i>Rainforest Alliance Carbon Curriculum</i></p> <p><a href="https://www.rainforest-alliance.org/curricula/climate">https://www.rainforest-alliance.org/curricula/climate</a></p> <p>Tree: Tree Benefits</p> <p><a href="http://www.treebenefits.com">www.treebenefits.com</a></p>

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<p><b>Working for the Future of Washington's Forests</b></p> <ol style="list-style-type: none"> <li>Everyone has a responsibility to treat forests with respect and to become a conscientious steward of Washington's forests and forest resources.</li> <li>Personal behaviors directly impact the health and resiliency of our forests. For example, the products we buy, how we treat trails and campgrounds, and how we hunt or use fire can either harm or help forests.</li> <li>Choices we make regarding the use of forest resources affect our ability to sustain forest ecosystems into the future.</li> <li>A variety of professionals and skilled trade workers are needed to sustain our forests, including foresters, biologists, soil scientists, engineers, lawyers, information technology professionals, land managers, investors, environmental educators, communications specialists, logging operators, mechanics, and wood products manufacturers.</li> <li>As individuals or as members of groups, we can influence laws and policies about Washington's forests.</li> </ol>	<p>HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</p> <p>HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.</p> <p>HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.</p>	<p><b>Focus on Forests</b> 4: Tough Choices 5: The Nature of Fire</p> <p><b>Forests of the World</b> 5: Understanding the Effects of Forest Uses 8: Making Consumer Choices</p> <p><b>Southeastern Forests and Climate</b> 1: Stepping through Climate Change 2: Clearing the Air 3: Atlas of Change 4: The Changing Forests 5: Managing Forests for Change 8: Counting Carbon 9: The Real Cost 10: Adventures Life Cycles Assessment 11: Life Cycle Assessment Debate 12: The Carbon Puzzle 13: Future of Our Forests</p> <p><b>Green Jobs: Exploring Forest Careers</b></p>	<p><b>Forests of Washington Ecosystems</b> 15. Less is More 17. Wood You Make a Difference? 19. Town Trees 20. Earthkeepers: From Schoolyard to Planet 22: A Washington Forest Fair.</p> <p><b>ELA Performance Tasks</b> Forest Benefits Forest Management Stormwater Pollution Summer in the City: Urban Heat Islands Invasive Plants Climate Change, Carbon, and Trees</p> <p><b>Guides</b> Project Based Learning Model FieldDesign: Engineering Design for Field-Based Applications 6-12</p> <p><b>Curriculum</b> Healthy Forests, Healthy Waters Drain Rangers Secondary Curriculum</p> <p><b>Career Profile Cards</b></p> <p><b>Solutions-Oriented Learning Storyline MS</b> Forests: Carbon Sequestration</p>	<p>Deer Dilemma</p> <p>Habitat Heroes</p> <p>Ecosystem Architects</p> <p>Sustainability: Then, Now, Later</p>	<p><b>OFRI</b> Forest Essays, Grades 7-12 Into the Forest Find Your Path Find Your Path videos</p> <p><b>Other</b> I-Tree: Tree Benefits <a href="http://www.treebenefits.com">www.treebenefits.com</a></p>