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.
Making Forest Connections — Grades 9-12

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.

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.

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.
Theme 1: What is a Forest?

<table>
<thead>
<tr>
<th>Definition of a Forest</th>
<th>Focus on Forests</th>
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</table>
| 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). 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). 3. Urban forests include all the publicly and privately owned trees within a city, town, or suburb working together as an ecosystem. 4. Trees compete with each other and with other plants growing near them for nutrients, sunlight, space and water. 5. The health and wellness of trees in a forest ecosystem depend on and are affected by many factors. | Focus on Forests 1: Monitoring Forest Health 7: Forest Invaders

**Forests of the World**

<table>
<thead>
<tr>
<th>Project Learning Tree Activities</th>
<th>PEI Resources</th>
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<tbody>
<tr>
<td>Forests of Washington Ecosystems 1. There’s no Place Like Home 2. Getting to know the Trees of Washington 3. Here’s Looking at Yew 4. Forest Homes</td>
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**ELA Performance Tasks**
Bioblitz Invasive Species

**Guides**
Field Investigations FieldDesign: Engineering Design for Field-Based Applications 6-12 Schoolyard Biodiversity

**Curriculum**
Healthy Forests, Healthy Waters

**WA CTE Framework: Forest Management**

**PLT Extensions**
Trees as Habitat and Tree Benefits Tree Abundance Field Investigation

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<thead>
<tr>
<th>Project WILD Activities</th>
<th>Additional Resources</th>
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</thead>
<tbody>
<tr>
<td>What’s That Habitat? Map that Habitat Forest in a Jar Time Lapse Raindrops and Ranges Bottleneck Genes</td>
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<tr>
<th>Additional Resources</th>
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<tbody>
<tr>
<td>OFRI Forest Essays Grade 7-12 Forest Fact Breaks: Ecosystems Tree Biology Forest Fact Sheets: Woody Biomass Inside Oregon’s Forests: A High School Forestry Curriculum</td>
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</tbody>
</table>
Trees as Part of the Forest
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.
2. Trees have life stages that include germination, growth, maturity, reproduction, decline and death.
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).
4. Trees compete with each other and with other plants growing near them for nutrients, sunlight, space and water.
5. The health and wellness of trees in a forest ecosystem depend on and are affected by many factors.

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<thead>
<tr>
<th>Washington Forest Education Framework</th>
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<th>Additional Resources</th>
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<tbody>
<tr>
<td>Trees as Part of the Forest</td>
<td>(Somewhat relevant) H5-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. H5-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. H5-LS2-1. Use mathematical and/or computational representations to support explanations for factors that affect carrying capacity of ecosystems at different scales.</td>
<td>Focus on Forests 1: Monitoring Forest Health 4: Tough Choices 6: Forest to Faucet 8: Climate Change and Forests</td>
<td>Forests of Washington Ecosystems 1. There’s no Place Like Home 2. Getting to know the Trees of Washington 4. Forest Homes</td>
<td>Environmental Barometer Phenology at Play</td>
<td>OFRI Forest Essays, Grades 7-12 Forest Fact Breaks: Tree Biology Carbon Capture Ecosystems Sustainability Water Woody Biomass Inquiry at Hinkle Creek Inside Oregon’s Forests: A High School Forestry Curriculum</td>
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<td>Southeastern Forests and Climate 1: Stepping Through Climate Science 3: Atlas of Change 8: Counting Carbon</td>
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<td>ELA Performance Tasks Bioblitz Forest Benefits Climate Change, Carbon, and Trees</td>
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<td>Guides Field Investigations FieldDesign: Engineering Design for Field-Based Applications 6-12 Fostering Outdoor Observation Skills</td>
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<td>Curriculum Healthy Forests, Healthy Waters</td>
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<td>Solutions-Oriented Learning Storyline HS- Forests: Carbon Sequestration</td>
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<td>WA CTE Framework: Forest Management</td>
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<td>PLT Extensions <a href="http://www.pltwa.com">www.pltwa.com</a> 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</td>
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<td><a href="http://www.treebenefits.com">www.treebenefits.com</a> <a href="http://www.budburst.org">www.budburst.org</a> - for Investigations in the forest</td>
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<tbody>
<tr>
<td><strong>Forests as Ecosystems</strong></td>
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</tbody>
</table>
| 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. | HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. | Focus on Forests 1: Monitoring Forest Health | Forests of Washington Ecosystems 1. There’s no Place Like Home | Birds of Prey  
Forest in a Jar  
Forest in a Jar  
Fire Ecologies  
Bottleneck Genes  
Oh Deer!  
Urban Nature Search  
Raindrops and Ranges  
Time Lapse  
Environmental Barometer  
Eco-enrichers  
| 2. Humans depend on and influence forest ecosystems and are themselves influenced by forest ecosystems. | HS-LS2-2. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. | Forests of the World 1: Making the Global Connection | Forests of Washington Ecosystems 2. Getting to know the Trees of Washington  | OFRI  
Forest Essays, Grades 7-12  
Forest Fact Breaks:  
Tree Biology  
Carbon Capture  
Photosynthesis  
Water  
Fire  
Fire Safety  
Forest Types  
Forest Fact Sheets:  
Carbon & Climate  
Drinking Water  
Photosynthesis  
Fire Where’s All the Carbon? (carbon cycle poster)  
Inquiry at Hinkle Creek  
Oregon's Forests (poster)  
Inside Oregon's Forests: A High School Forestry Curriculum  |                     |
| 3. Forest ecosystems include processes such as photosynthesis, energy flow and the cycling of nutrients, water, carbon, and other matter. | 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. | Forests of the World 2: What is a Forest? | Forests of Washington Ecosystems 3. Here’s Looking at Yew |                     |
| 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). | HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. | Forests of the World 3: Mapping the World’s Forests | Forests of Washington Ecosystems 4. Forest Homes |                     |
| 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. | | Forests of the World 4: Analyzing Patterns of Forest Change | Forests of Washington Ecosystems 5. Come Grow with Us |                     |
| 6. Forests are interconnected with other terrestrial (e.g., rangeland) and aquatic (e.g., estuary) ecosystems, forming a larger system. | | Forests of the World 5: Understanding the Effects of Forest Uses | Forests of Washington Ecosystems 6. Washington Forest Eco-Connections |                     |
| 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. | | Forests of the World 6: Seeking Sustainability: A Global Response | Forests of Washington Ecosystems 7. Fire: Friend or Foe |                     |

**Additional Resources:**
- **ELA Performance Tasks:** Bioblitz  
Climate Change Carbon and Trees  
Forest Management  
Guides  
Field Investigations  
FieldDesign: Engineering Design for Field-Based Applications 6-12  
Photo Point Monitoring  
Schoolyard Biodiversity  
Curriculum  
Healthy Forests, Healthy Waters  
WA CTE Framework: Forest Management  
PLT Extensions [www.pltwa.com](http://www.pltwa.com)  
Forest Benefits student page  
Trees as Habitat and Tree Benefits  
Leaves as a System  
Tree Abundance Field Investigation  
Temperature investigation journal  
Rainfall investigation  
Habitat diversity field investigations  
- **OFRI:**  
Forest Essays, Grades 7-12  
Forest Fact Breaks:  
Tree Biology  
Carbon Capture  
Photosynthesis  
Water  
Fire  
Fire Safety  
Forest Types  
Forest Fact Sheets:  
Carbon & Climate  
Drinking Water  
Photosynthesis  
Fire Where’s All the Carbon? (carbon cycle poster)  
Inquiry at Hinkle Creek  
Oregon's Forests (poster)  
Inside Oregon's Forests: A High School Forestry Curriculum
### Theme 2: Why are Forests Important?

#### Historical Importance
1. Today, as in the past, forest continue to play a significant cultural, spiritual, and economic role in Native American Societies.
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.
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.
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.

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<td>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.</td>
<td>Focus on Forests 7: Forest Invaders Forests of the World 3: Mapping the World’s Forests Forests of Washington Ecosystems 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</td>
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<td>Southeastern Forests and Climate 6: Mapping Seed Sources</td>
<td>Forests of Washington Ecosystems</td>
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<tr>
<td><strong>Environmental Importance</strong></td>
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<tr>
<td>1. Forests affect air, water, and soil quality.</td>
<td>HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.</td>
<td><strong>Focus on Forests</strong>&lt;br&gt;1. Monitoring Forest Health&lt;br&gt;6. Forest to Faucet&lt;br&gt;7. Forest Invaders&lt;br&gt;8. Climate Change and Forests</td>
<td><strong>Forests of Washington Ecosystems</strong> 11. Watershed Benefits 19. Town Trees</td>
<td><strong>Map that</strong>&lt;br&gt;Habitat&lt;br&gt;<strong>Graphpanimal</strong>&lt;br&gt;Eco-Enrichers&lt;br&gt;Environmental Barometer</td>
<td><strong>OFRI</strong>&lt;br&gt;Forest Essays, Grades 7-12&lt;br&gt;Forest Fact Breaks: Water&lt;br&gt;Wildlife&lt;br&gt;Carbon Capture&lt;br&gt;<strong>Forest Fact Sheets</strong>: Wildlife&lt;br&gt;Drinking Water&lt;br&gt;Woody Biomass&lt;br&gt;Carbon &amp; Climate&lt;br&gt;<strong>Where's All the Carbon?</strong> (carbon cycle poster)&lt;br&gt;<strong>Oregon Forest Facts &amp; Figures</strong>&lt;br&gt;Inquiry at Hinkle Creek (video)&lt;br&gt;<strong>Inside Oregon's Forests</strong>: A High School Forestry Curriculum&lt;br&gt;<strong>Other</strong>&lt;br&gt;I-Tree: Tree Benefits&lt;br&gt;<a href="http://www.treebenefits.com">www.treebenefits.com</a></td>
</tr>
<tr>
<td>3. Forests provide the opportunity to study ecosystems, conservation, and natural resource management.</td>
<td>HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem</td>
<td><strong>Southeastern Forests and Climate</strong>&lt;br&gt;1: Stepping through Climate Change&lt;br&gt;4: The Changing Forests&lt;br&gt;5: Managing Forests for Change&lt;br&gt;7: Carbon on the Move&lt;br&gt;8: Counting Carbon&lt;br&gt;12: The Carbon Puzzle</td>
<td><strong>Career Profile Cards</strong>&lt;br&gt;<strong>Solutions-Oriented Learning Storyline</strong>&lt;br&gt;MS: Forests: Carbon Sequestration</td>
<td><strong>Curriculum</strong>&lt;br&gt;Healthy Forests, Healthy Waters&lt;br&gt;Drain Rangers&lt;br&gt;<strong>WA CTE Framework: Forest Management</strong></td>
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<td>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.</td>
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<td><strong>Green Jobs: Exploring Forest Careers</strong>&lt;br&gt;<strong>Focus on Forests</strong>&lt;br&gt;5: The Nature of Fire&lt;br&gt;9: Words to Live By</td>
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<td>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.</td>
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<td><strong>Forests of the World</strong>&lt;br&gt;1: Making the Global Connection&lt;br&gt;2: What Is a Forest?&lt;br&gt;7: Exploring the World Marketplace&lt;br&gt;9: Researching Forests of the World</td>
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**Social Importance**

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<tbody>
<tr>
<td>1. Washington’s forests provide basic resources that people use every day.</td>
<td></td>
<td><strong>Focus on Forests</strong>&lt;br&gt;5: The Nature of Fire&lt;br&gt;9: Words to Live By</td>
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<tr>
<td>2. Individuals hold different values concerning forests and their use, based on their experience and connection with the forest.</td>
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<td><strong>Forests of the World</strong>&lt;br&gt;1: Making the Global Connection&lt;br&gt;2: What Is a Forest?&lt;br&gt;7: Exploring the World Marketplace&lt;br&gt;9: Researching Forests of the World</td>
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<tr>
<td>3. Forests influence the economic, social and cultural composition of both urban and rural communities</td>
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<td><strong>Forests of Washington Ecosystems</strong>&lt;br&gt;11. Watershed Benefits&lt;br&gt;19. Town Trees</td>
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<td><strong>ELA Performance Tasks</strong>&lt;br&gt;Forest Management 6-8&lt;br&gt;Climate, Carbon, and Trees&lt;br&gt;Summer in the City: Urban Heat Islands&lt;br&gt;Invasive Species</td>
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<td><strong>WA CTE Framework: Forest Management</strong></td>
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| **Additional Resources**<br> | **OFRI**<br>Forest Essays, Grades 7-12<br>Forest Fact Breaks: Water<br>Wildlife<br>Carbon Capture<br>**Forest Fact Sheets**: Wildlife<br>Drinking Water<br>Woody Biomass<br>Carbon & Climate<br>**Where's All the Carbon?** (carbon cycle poster)<br>**Oregon Forest Facts & Figures**<br>Inquiry at Hinkle Creek (video)<br>**Inside Oregon's Forests**: A High School Forestry Curriculum<br>**Other**<br>I-Tree: Tree Benefits<br>[www.treebenefits.com](http://www.treebenefits.com) | |

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*Note: The table entries are placeholders as the content is not fully transcribed in the image.*
## Economic Importance

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.

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.

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.

4. Economic returns to forest landowners are important in preventing the loss of forests to other non-forest land uses.

### Economic Importance

- **NGSS Performance Expectations**: HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

- **Focus on Forests Activities**: 1. Monitoring Forest Health
  2. Who Owns America’s Forests?
  3. Forest to Faucet
  4. Climate Change and Forests

- **Forests of the World Activities**: 1. Making the Global Connection
  2. Understanding the Effects of Forest Uses
  3. Seeking Sustainability: A Global Response
  4. Exploring the World Marketplace
  5. Making Consumer Choices
  6. Researching Forests of the World

- **Southeastern Forests and Climate Activities**: 1. Stepping through Climate Change
  2. Clearing the Air
  3. The Changing Forests
  4. Managing Forests for Change
  5. Counting Carbon
  6. The Real Cost
  7. Adventures in Life Cycles Assessment
  8. Life Cycle Assessment Debate
  9. The Carbon Puzzle

- **Green Jobs: Exploring Forest Careers**

## Additional Resources

- **OFRI**: Find Your Path
- **Other Resources**
  - Find Your Path videos
  - Forest Essays, Grades 7-12
  - **Forest Fact Breaks**: Carbon Capture
  - **Green Building**
  - **Wood Products**
  - **Forest Fact Sheets**: Forests
  - **Carbon & Climate**
  - **Drinking Water**
  - **Where’s All the Carbon? (carbon cycle poster)**
  - **Inquiry at Hinkle Creek (video)**
  - **Oregon Forest Facts & Figures**
  - **Inside Oregon’s Forests**: A High School Forestry Curriculum
  - **I-Tree: Tree Benefits**
  - **www.treebenefits.com**

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**Washington Forest Education Framework**

**NGSS Performance Expectations**

**Project Learning Tree Activities**

**PEI Resources**

**Project WILD Activities**

**Additional Resources**
Making Forest Connections — Grades 9-12

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

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<tr>
<td><strong>Forest Ownership</strong></td>
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<td>Focus on Forests</td>
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<td>Forests of Washington Ecosystems</td>
<td>Wild Bill’s Fate</td>
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<tr>
<td>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.</td>
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<td>3: Who Owns America’s Forests?</td>
<td></td>
<td>7: Fire: Friend or Foe?</td>
<td>OFRI Forest Fact Sheet: Ownership</td>
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<tr>
<td>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.</td>
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<td>5: The Nature of Fire</td>
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<td>13. Who Manages Washington’s Forests?</td>
<td>Oregon Forest Facts &amp; Figures</td>
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<tr>
<td>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.</td>
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<td>6: Forest to Faucet</td>
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<td>14. Where There’s a Will There’s a Way</td>
<td>Forest Fact Breaks: Fire Safety</td>
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<td>4. Many forest landscapes are made up of a variety of ownerships, a mix of management objectives, and a blend of forest ecosystems.</td>
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<td>Forests of the World 3: Mapping the World’s Forests</td>
<td></td>
<td>18. Let’s Make a Deal</td>
<td>Inquiry at Hinkle Creek (video)</td>
</tr>
</tbody>
</table>

**Forest Management**

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.
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.
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.

**Forest Management Activities**

- Focus on Forests 2: Story of Succession
- **Forests of the World**
  1. Making the Global Connection
  2. Analyzing Patterns of Forest Change
  3. Seeking Sustainability: A Global Response
  4. Exploring the World Marketplace
  5. Researching Forests of the World

**Southeastern Forests and Climate**

- 1: Stepping through Climate Change
- 2: Clearing the Air
- 3: Atlas of Change
- 4: The Changing Forests
- 5: Managing Forests for Change
- 6: Counting Carbon
- 12: The Carbon Puzzle

**ELA Performance Tasks**

- Forest Benefits
- Forest Management
- Stormwater Pollution
- Summer in the City: Urban Heat Islands
- Invasive Plants
- Climate Change, Carbon, and Trees

**Guides**

- Bat Blitz
- Time Lapse
- Ecosystem Architects
- Deer Dilemma
- Migration Barriers
- A Picture is Worth a Thousand Words
- Natural Dilemmas

**Other**

- I-Tree: Tree Benefits
- www.treebenefits.com
Making Forest Connections — Grades 9-12

which aims to sustain forest land for timber production and the other benefits forests provide, including clean water, wildlife habitat, and recreation.

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.

<table>
<thead>
<tr>
<th>Washington Forest Education Framework</th>
<th>NGSS Performance Expectations</th>
<th>Project Learning Tree Activities</th>
<th>PEI Resources</th>
<th>Project WILD Activities</th>
<th>Additional Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>2. Forest resource professionals aim to meet individual, societal and environmental needs.</td>
<td>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.</td>
<td>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).</td>
<td>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.</td>
<td>6. Government has a role in actively engaging organizations, businesses, communities and individuals in forest management and policy decisions,</td>
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<tr>
<td>2. Forest resource professionals aim to meet individual, societal and environmental needs.</td>
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</tbody>
</table>
Making Forest Connections — Grades 9-12

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.

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.

### Washington Forest Education Framework

**Forest Management Perspectives**

1. People have differing perspectives about forest management, which can be affected by politics, science, economics, values, perception, and experience.

2. Forest management can be controversial because of diverse perspectives as well as the complex nature of forest ecosystems.

3. Issues related to forest management include the effects of timber harvest, carbon sequestration and climate change, forest land uses, wildfire, and others.

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.

### NGSS Performance Expectations

<table>
<thead>
<tr>
<th>HS-LS1-5</th>
<th>Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.</th>
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</thead>
<tbody>
<tr>
<td>HS-LS2-7</td>
<td>Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</td>
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<tr>
<td>HS-ETS1-1</td>
<td>Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.</td>
</tr>
</tbody>
</table>

### Project Learning Tree Activities

- **Focus on Forests**
  - 4: Tough Choices
  - 9: Words to Live By
  - 5: The Nature of Fire
  - 8: Climate Change and Forests

- **Forests of the World**
  - 1: Making the Global Connection
  - 2: What Is a Forest?
  - 5: Understanding the Effects of Forest Uses
  - 7: Exploring the World Marketplace

- **Southeastern Forests and Climate**
  - 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

- **Green Jobs: Exploring Forest Careers**

### PEI Resources

- **Forests of Washington Ecosystems**
  - 7. Fire: Friend or Foe?
  - 8. The Forest Flu
  - 9. Weather Waltzes with the Forest
  - 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

- **ELA Performance Tasks**
  - **Forest Management**
  - **Stormwater Pollution**
  - **Summer in the City: Urban Heat Islands**
  - **Invasive Plants**
  - **Climate Change, Carbon, and Trees**

### Project WILD Activities

- **Back from the Brink**
- **Wildlife and the Environment: Community Survey**
- **Deer Dilemma**
- **Fire Ecology**
- **Changing the Land**
- **To Zone or Not to Zone**

### Additional Resources

- **OFRI Forest Fact Breaks: Clearcutting**
- **Forest Fact Sheets: Carbon & Climate**
- **Clearcutting Inside Oregon’s Forests: A High School Forestry Curriculum**

Other

- **I-Tree: Tree Benefits**

Rainforest Alliance Carbon Curriculum

[https://www.rainforest-alliance.org/curricula/climate](https://www.rainforest-alliance.org/curricula/climate)
## Theme 4: What is Our Responsibility to Washington Forests?

<table>
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<tr>
<td>Our Connection to Washington’s Forests</td>
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<td>Forests of the World</td>
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<td>OFRI</td>
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<tr>
<td>1. Everyone should have the opportunity to identify and explore their personal connection with forests.</td>
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<td>5: Understanding the Effects of Forest Uses</td>
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<td>Animal Poetry</td>
<td>Forest Essays, Grades 7-12</td>
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<td>2. Resources we use and consume every day are connected to Washington’s forests.</td>
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<td>8: Making Consumer Choices</td>
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<td>Learning to Look, Looking to See</td>
<td>Other</td>
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<td>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.</td>
<td></td>
<td></td>
<td>Forests of Washington Ecosystems</td>
<td>Nature in Art</td>
<td>The Truth about Science: A Curriculum for Developing Young Scientists, by Kathryn Kelsey and Ashley Steel. NSTA Press</td>
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<td>1. There’s no Place Like Home</td>
<td>Graphananimal</td>
<td>Citizen Science: 15 Lessons that Bring Biology to Life, 6-12 - NSTA Press</td>
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<td>2. Getting to know the Trees of Washington</td>
<td>Urban Nature Search (adapt to forests)</td>
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<td>3. Here’s Looking at Yew</td>
<td>Eco-Enrichers</td>
<td>Rainforest Alliance Carbon Curriculum</td>
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<td>4. Forest Homes</td>
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<td><a href="https://www.rainforest-alliance.org/curricula/climate">https://www.rainforest-alliance.org/curricula/climate</a></td>
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<td>5. Come Grow with Us</td>
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<td>Tree: Tree Benefits</td>
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<td>11. Watershed Benefits</td>
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<td>15. Less is More</td>
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<td>16. Tree Uses</td>
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<td>17. Wood You Make a Difference?</td>
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<td>Summer in the City: Urban Heat Islands</td>
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<td>Project Based Learning Model</td>
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<td>Fostering Outdoor Observation Skills</td>
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<td>Photo Point Monitoring</td>
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<td>FieldDesign: Engineering Design for Field-Based Applications 8-12</td>
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<td>Healthy Forests, Healthy Waters</td>
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### Working for the Future of Washington’s Forests
1. Everyone has a responsibility to treat forests with respect and to become a conscientious steward of Washington’s forests and forest resources.
2. 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.
3. Choices we make regarding the use of forest resources affect our ability to sustain forest ecosystems into the future.
4. 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.
5. As individuals or as members of groups, we can influence laws and policies about Washington’s forests.

### NGSS Performance Expectations
- HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
- HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

### Project Learning Tree Activities
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  - 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
- **Green Jobs: Exploring Forest Careers**

### PEI Resources
- **Forests of Washington Ecosystems**
  - 15. Less is More
  - 17. Wood You Make a Difference?
- **Town Trees**
- **Earthkeepers: From Schoolyard to Planet**
- **A Washington Forest Fair.**

### Project WILD Activities
- Deer Dilemma
- Habitat Heroes
- Ecosystem Architects
- Sustainability: Then, Now, Later

### Additional Resources
- **OFRI**
  - Forest Essays, Grades 7-12
  - Into the Forest
  - Find Your Path
  - Find Your Path videos
- **Other**
  - i-Tree: Tree Benefits
  - [www.treebenefits.com](http://www.treebenefits.com)