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 Education K-12 Learning 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 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.

Making Forest Connections — Grades 9-12

About the Resources
This document identifies connections between the Washington Forest Education K-12 Learning 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.

Project Learning Tree (PLT) 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.

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

- PEI Guides
- ELA Performance Tasks
- Forests of Washington Lessons
- Healthy Forests, Healthy Waters Curriculum
- PLT extension activities
- Career Profile Cards
- WA CTE Framework: Forest Management
- Solution Oriented Learning Storylines (SOLS)

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

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: oregonforests.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.

Making Forest Connections — Grades 9-12

Theme 1: What is a Forest?

Washington Forest Education Framework	NGSS Performance Expectations	Project Learning Tree Activities	PEI Resources	Project WILD Activities	Additional Resources
Definition of a Forest 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** 2: What Is a Forest? 3: Mapping the World's Forests 4: Analyzing Patterns of Forest Change	**Forests of Washington** 1. There's no Place Like Home 2. Getting to know the Trees of Washington 3. Here's Looking at Yew 4. Forest Homes **ELA Performance Tasks** Climate Change, Carbon, and Trees (Grade 9-10) **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** **www.pltwa.com** Trees as Habitat and Tree Benefits Tree Abundance Field Investigation **Solutions Oriented Learning Storylines** Urban Forestry: Designing the Urban Forest for Ecosystem Benefits	What's That Habitat? Map that Habitat Forest in a Jar Time Lapse Raindrops and Ranges Bottleneck Genes	**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

Making Forest Connections — Grades 9-12

Theme 1: What is a Forest?

Washington Forest Education Framework	NGSS Performance Expectations	Project Learning Tree Activities	PEI Resources	Project WILD Activities	Additional Resources
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.	(Somewhat relevant) HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. 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. HS-LS2-1. Use mathematical and/or computational representations to support explanations for factors that affect carrying capacity of ecosystems at different scales. HS-LS2-1. Use mathematical and/or computational representations to support explanations for factors that affect carrying capacity of ecosystems at different scales.	**Focus on Forests** 1: Monitoring Forest Health 4: Tough Choices 6: Forest to Faucet 8: Climate Change and Forests **Forests of the World** 6: Seeking Sustainability: A Global Response 7: Exploring the World Marketplace **Southeastern Forests and Climate** 1: Stepping Through Climate Science 3: Atlas of Change 8: Counting Carbon	**Forests of Washington** 1. There's no Place Like Home 2. Getting to know the Trees of Washington 4. Forest Homes **ELA Performance Tasks** Climate Change, Carbon, and Trees (Grade 9-10) **Guides** Field Investigations FieldDesign: Engineering Design for Field-Based Applications 6-12 Fostering Outdoor Observation Skills **Curriculum** Healthy Forests, Healthy Waters **Solutions Oriented Learning Storylines** Forests: Carbon Sequestration (also available in Spanish) **WA CTE Framework: Forest Management** **PLT Extensions** **www.pltwa.com** 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	Environmental Barometer Phenology at Play	**OFRI** Forest Essays, Grades 7-12 **Forest Fact Breaks:** Tree Biology Carbon Capture Ecosystems Sustainability Water Woody Biomass **Inquiry at Hinkle Creek** (video) **Inside Oregon's Forests**: A High School Forestry Curriculum **Other** I-Tree: Tree Benefits www.treebenefits.com www.budburst.org -for Investigations in the forest

Making Forest Connections — Grades 9-12

Theme 1: What is a Forest?					
Washington Forest Education Framework	**NGSS Performance Expectations**	**Project Learning Tree Activities**	**PEI Resources**	**Project WILD Activities**	**Additional Resources**
Forest Classification 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. 2. Different forest biomes exist around the world. Examples include tropical forests, temperate forests, and boreal forests. Washington is in the temperate forest biome. 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.	HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations 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.	**PLT PreK-8 Guide** 29: Rain Reasons 64: Looking at Leaves 68: Name that Tree **Focus on Forests** 7: Forest Invaders **Forests of the World** 3: Mapping the World's Forests **Southeastern Forests and Climate** 6: Mapping Seed Sources	**Forests of Washington** 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 **PLT Extensions** **www.pltwa.com** Habitat diversity field investigation Tree abundance field investigation **WA CTE Framework: Forest Management**	Raindrops and Ranges Time Lapse	**OFRI** **Forest Fact Break**: Forest Types **Inside Oregon's Forests**: A High School Forestry Curriculum **Oregon's Forests** (poster) **Other** www.budburst.org -for Investigations in the forest

Making Forest Connections — Grades 9-12

Theme 2: Why Are Forests Important?

Washington Forest Education Framework	NGSS Performance Expectations	Project Learning Tree Activities	PEI Resources	Project WILD Activities	Additional Resources
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.	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. HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.	**Focus on Forests** 9: Words to Live By **Forests of the World** 2: What Is a Forest? **Southeastern Forests and Climate** 1: Stepping through Climate Change 4: The Changing Forests 5: Managing Forests for Change 12: The Carbon Puzzle	Forests of Washington 13. Who Manages Washington's Forests? 14. Where There's a Will There's a Way 21. A Forest Full of Views	Deer Dilemma A Picture Is Worth a Thousand Words	OFRI Forest Essays, Grades 7-12 **Inside Oregon's Forests**: A High School Forestry Curriculum
Environmental Importance 1. Forests affect air, water, and soil quality.	HS-ESS3-3. Create a computational simulation to illustrate the relationships among the	**Focus on Forests** 1: Monitoring Forest Health 6: Forest to Faucet 7: Forest Invaders	Forests of Washington 3. Here's Looking at Yew 4. Forest Homes 5. Come Grow with Us	Map that Habitat Graphananimal	OFRI Forest Essays, Grades 7-12 **Forest Fact Breaks**: Water

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Theme 2: Why Are Forests Important?

Washington Forest Education Framework	NGSS Performance Expectations	Project Learning Tree Activities	PEI Resources	Project WILD Activities	Additional Resources
2. Forests provide habitat for fish and wildlife. 3. Forests provide the opportunity to study ecosystems, conservation, and natural resource management. 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. 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.	management of natural resources, the sustainability of human populations, and biodiversity. HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem	8: Climate Change and Forests **Forests of the World** 4: Analyzing Patterns of Forest Change 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 **Southeastern Forests and Climate** 1: Stepping through Climate Change 4: The Changing Forests 5: Managing Forests for Change 7: Carbon on the Move 8: Counting Carbon 12: The Carbon Puzzle **Green Jobs: Exploring Forest Careers**	6. Washington Forest Eco-connections 19. Town Trees **ELA Performance Tasks** Climate Change, Carbon, and Trees (Grade 9-10) Integrated Pest Management (Grade 9-11) **Guides** Field Investigations FieldDesign: Engineering Design for Field-Based Applications 6-12 Fostering Outdoor Observation Skills Landscape Investigations **Career Profile Cards** **Solutions-Oriented Learning Storylines** Forests: Carbon Sequestration (also available in Spanish) **Curriculum** Heathy Forests, Healthy Waters Drain Rangers **WA CTE Framework: Forest Management**	Eco-Enrichers Environmental Barometer	Wildlife Carbon Capture **Forest Fact Sheets:** Wildlife Drinking Water Woody Biomass Carbon & Climate **Where's All the Carbon?** (carbon cycle poster) **Oregon Forest Facts & Figures** **Inquiry at Hinkle Creek** (video) **Inside Oregon's Forests**: A High School Forestry Curriculum **Other** I-Tree: Tree Benefits www.treebenefits.com
Social Importance 1. Washington's forests provide basic resources that people use every day. 2. Individuals hold different values concerning forests and their use, based on their experience and connection with the forest.		**Focus on Forests** 5: The Nature of Fire 9: Words to Live By **Forests of the World** 1: Making the Global Connection 2: What Is a Forest? 7: Exploring the World Marketplace	**Forests of Washington** 11. Watershed Benefits 19. Town Trees **ELA Performance Tasks** Climate Change, Carbon, and Trees (Grade 9-10) Urban Heat Island Effect (Gr. 9-10)	Deer Dilemma Migration Barriers Nature in Art Natural Dilemmas	**OFRI** Forest Essays, Grades 7-12 **Forest Fact Sheets:** Forests Oregon Forest Facts & Figures **Inside Oregon's Forests**: A High School Forestry Curriculum

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Theme 2: Why Are Forests Important?

Washington Forest Education Framework	NGSS Performance Expectations	Project Learning Tree Activities	PEI Resources	Project WILD Activities	Additional Resources
3. Forests influence the economic, social and cultural composition of both urban and rural communities		9: Researching Forests of the World	**WA CTE Framework: Forest Management** **Solutions Oriented Learning Storylines** Fire: Forest Management (also available in Spanish) Urban Forestry: Designing the Urban Forest for Ecosystem Benefits		
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	HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	**Focus on Forests** 1: Monitoring Forest Health 3: Who Owns America’s Forests? 6: Forest to Faucet 8: Climate Change and Forests **Forests of the World** 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 **Southeastern Forests and Climate** 1: Stepping through Climate Change 2: Clearing the Air 4: The Changing Forests 5: Managing Forests for Change	**Forests of Washington** 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 **ELA Performance Tasks** Climate Change, Carbon, and Trees (Grade 9-10) Urban Heat Island Effects (Gr. 9-10) **Guides** Landscape Investigation **Career Profile Cards** **Solutions-Oriented Learning Storylines** Forests: Carbon Sequestration (also available in Spanish) Urban Forestry: Designing the Urban Forest for Ecosystem Benefits	Natural Dilemmas	**OFRI** Find Your Path 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 **Other** I-Tree: Tree Benefits www.treebenefits.com

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Theme 2: Why Are Forests Important?					
Washington Forest Education Framework	**NGSS Performance Expectations**	**Project Learning Tree Activities**	**PEI Resources**	**Project WILD Activities**	**Additional Resources**
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.		8: Counting Carbon 9: The Real Cost 10: Adventures in Life Cycles Assessment 11: Life Cycle Assessment Debate 12: The Carbon Puzzle **PLT Green Jobs: Exploring Forest Careers**	**Curriculum** Healthy Forests, Healthy Waters **WA CTE Framework: Forest Management**		

Making Forest Connections — Grades 9-12

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**
Forest Ownership 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. 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. 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. 4. Many forest landscapes are made up of a variety of ownerships, a mix of management objectives, and a blend of forest eco-systems.		**Focus on Forests** 3: Who Owns America's Forests? 5: The Nature of Fire 6: Forest to Faucet **Forests of the World** 3: Mapping the World's Forests	**Forests of Washington** 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 **Career Profile Cards** **WA CTE Framework: Forest Management** **Solutions-Oriented Learning Storylines** Fire: Forest Management (also available in Spanish) Urban Forestry: Designing the Urban Forest for Ecosystem Benefits	Wild Bill's Fate	**OFRI** **Forest Fact Sheet:** Ownership **Oregon** Forest Facts & Figures **Forest Fact Break**s: Fire Safety **Inquiry at Hinkle Creek** (video)

Making Forest Connections — Grades 9-12

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
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. 4. In Washington, forest management in private and state forests is regulated by the Washington Forest Practices Act, 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	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. HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity. 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.	**Focus on Forests** 2: Story of Succession **Forests of the World** 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 **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**	**Forests of Washington** 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 **ELA Performance Tasks** Climate Change, Carbon, and Trees (Grade 9-10) Urban Heat Island Effects (Gr. 9-10) Integrated Pest Management (Gr. 9-11) **Guides** Field Investigations Schoolyard Biodiversity **Curriculum** Healthy Forests, Healthy Waters **Solutions Oriented Learning Storylines** Forests: Carbon Sequestration (also available in Spanish) Fire: Forest Management (also available in Spanish) Urban Forestry: Designing the Urban Forest for Ecosystem Benefits **Career Profile Cards**	Bat Blitz Time Lapse Ecosystem Architects Deer Dilemma Migration Barriers A Picture is Worth a Thousand Words Natural Dilemmas Sustainability: Then. Now. Later.	**OFRI** Forest Essays, Grades 7-12 **Forest Fact Breaks**: Forest Management Clearcutting Reforestation Sustainability Water **Inquiry at Hinkle Creek** (video) **Forest Fact Sheets:** Clearcutting Forests Reforestation Drinking Water Protection Laws **Oregon Forest Facts & Figures** **Inside Oregon's Forests**: A High School Forestry Curriculum **Other** I-Tree: Tree Benefits www.treebenefits.com

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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
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.			WA CTE Framework: Forest Management		
Forest Management Decisions 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. 2. Forest resource professionals aim to meet individual, societal and environmental needs. 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. 4. Washington foresters and forest managers prepare forest management plans based on landowner goals and objectives, capabilities of the forest site,	HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.	**Focus on Forests** 1: Monitoring Forest Health 3: Who Owns America's Forests? 4: Tough Choices 5: The Nature of Fire 7: Forest Invaders **Forests of the World** 6: Seeking Sustainability: A Global Response 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 13: Future of Our Forests	Forests of Washington 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 ELA Performance Tasks Climate Change, Carbon, and Trees (Grade 9-10) Urban Heat Island Effect (Gr. 9-10) Integrated Pest Management (Grade 9-11) Career Profile Cards **Solutions Oriented Learning Storylines** Forests: Carbon Sequestration (also available in Spanish)	Deer Dilemma Wild Bill's Fate Bird Song Survey A Picture Is Worth a Thousand Words Migration Barriers Ecosystem Architects Natural Dilemmas Sustainability: Then. Now. Later.	**OFRI** Find Your Path Find Your Path videos **Forest Fact Breaks:** Clearcutting Fire Sustainability **Forest Fact Sheets:** Clearcutting Fire Protection Laws Sustainability Inquiry at Hinkle Creek (video) **Inside Oregon's Forests**: A High School Forestry Curriculum **Other** I-Tree: Tree Benefits www.treebenefits.com

Making Forest Connections — Grades 9-12

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**
laws, and available tools (e.g., planting, harvesting, and using prescribed fire). 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. 6.Government has a role in actively engaging organizations, businesses, communities and individuals in forest management and policy decisions, especially for publicly owned forests. 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.		**Green Jobs: Exploring Forest Careers**	Fire: Forest Management (also available in Spanish) Urban Forestry: Designing the Urban Forest for Ecosystem Benefits **Curriculum** Heathy Forests, Healthy Waters **WA CTE Framework: Forest Management**		

Making Forest Connections — Grades 9-12

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
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.	HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. 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.	**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 13: Future of Our Forests **Green Jobs: Exploring Forest Careers**	**Forests of Washington** 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 **ELA Performance Tasks** Climate Change, Carbon, and Trees (Grade 9-10) Urban Heat Island Effect (Gr. 9-10) Integrated Pest Management (Grade 9-11) **Career Profile Cards** **Guides:** FieldDesign: Engineering Design for Field-Based Applications 6-12 Project Based Learning Model **WA CTE Framework: Forest Management** **Solutions Oriented Learning Storylines** Fire: Forest Management (also available in Spanish) Urban Forestry: Designing the Urban Forest for Ecosystem Benefits	Back from the Brink Wildlife and the Environment: Community Survey Deer Dilemma Fire Ecology Changing the Land Phenology at Play To Zone or Not to Zone Natural Dilemmas (adapt) Sustainability: Then. Now. Later. Changing the Land	**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 www.treebenefits.com Rainforest Alliance Carbon Curriculum **https://www.rainforest-alliance.org/curricula/climate**

Making Forest Connections — Grades 9-12

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
Our Connection to Washington's Forests 1. Everyone should have the opportunity to identify and explore their personal connection with forests. 2. Resources we use and consume every day are connected to Washington's forests. 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.		**Forests of the World** 5: Understanding the Effects of Forest Uses 8: Making Consumer Choices	**Forests of Washington** 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 11. Watershed Benefits 15. Less is More 16. Tree Uses 17. Wood You Make a Difference? **ELA Performance Tasks** Urban Heat Island Effect (Grade 9-10) **Guides** Field Investigations Project Based Learning Model Fostering Outdoor Observation Skills Photo Point Monitoring FieldDesign: Engineering Design for Field-Based Applications 6-12 **PLT Extensions** **www.pltwa.com** Trees as Habitat and Tree Benefits **Curriculum** Healthy Forests, Healthy Waters	Animal Poetry Learning to Look, Looking to See Nature in Art Graphananimal Urban Nature Search (adapt to forests) Eco-Enrichers	**OFRI** Forest Essays, Grades 7-12 **Other** *The Truth about Science: A Curriculum for Developing Young Scientists*, by Kathryn Kelsey and Ashley Steel. NSTA Press *Citizen Science: 15 Lesson that Bring Biology to Life*, 6-12 - NSTA Press *Rainforest Alliance Carbon Curriculum* **https://www.rainforest-alliance.org/curricula/climate** Tree: Tree Benefits www.treebenefits.com

Making Forest Connections — Grades 9-12

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
			Solutions Oriented Learning Storylines Urban Forestry: Designing the Urban Forest for Ecosystem Benefits		
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.	HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. 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.	**Focus on Forests** 4: Tough Choices 5: The Nature of Fire **Forests of the World** 5: Understanding the Effects of Forest Uses 8: Making Consumer Choices **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 9: The Real Cost 10: Adventures Life Cycles Assessment 11: Life Cycle Assessment Debate 12: The Carbon Puzzle 13: Future of Our Forests **Green Jobs: Exploring Forest Careers**	**Forests of Washington** 15. Less is More 17. Wood You Make a Difference? 19. Town Trees 20. Earthkeepers: From Schoolyard to Planet 22: A Washington Forest Fair. **ELA Performance Tasks** Climate Change, Carbon, and Trees (Grade 9-10) Urban Heat Island Effect (Gr. 9-10) Integrated Pest Management (Grade 9-11) **Guides** Project Based Learning Model FieldDesign: Engineering Design for Field-Based Applications 6-12 **Curriculum** Healthy Forests, Healthy Waters Drain Rangers (Secondary) **Career Profile Cards**	Deer Dilemma Habitat Heroes Ecosystem Architects Sustainability: Then, Now, Later	**OFRI** Forest Essays, Grades 7-12 Into the Forest Find Your Path Find Your Path videos **Other** I-Tree: Tree Benefits www.treebenefits.com

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5. As individuals or as members of groups, we can influence laws and policies about Washington's forests.			**Solutions-Oriented Learning Storyline** Forests: Carbon Sequestration (also available in Spanish) Fire: Forest Management (also available in Spanish)		