

Introduction to Forestry

Open Educational Resource



View of the Second Falls on the Sawkill River, c 1840 John Rubens Smith, [NGA 169455.jpg](#)

Prepared for Oregon Educational Resources

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Introduction

Welcome to forestry.

What does forestry even mean? Well, what it means has changed a lot over time. As the public's perception of forestry has changed so has the profession. The 1944 and 1958 Society of American Foresters (SAF) Dictionary of Forestry, defined forestry as "the scientific management of forests for the continuous production of goods and services." Compare that to the most recent 2018 SAF Dictionary of Forestry which defines forestry as:

"the profession embracing the science, art and practice of creating, managing using, and conserving forests and associated resources for human benefit and in a sustainable manner to meet desired goals, needs and values -*note* the broad field of forestry consists of those biological, quantitative, managerial, and social sciences that are applied to forest management and conservation; it includes specialized fields such as agroforestry, urban forestry, industrial forestry, nonindustrial forestry, and wilderness and recreation forestry."¹

As you can read, the profession has changed over time and now encompasses a variety of disciplines all adapted to meet desired goals, needs and values. This text is not comprehensive of all the disciplines but an introduction to them. Additionally, as this is an Introduction to Forestry, the set of readings was selected to be engaging and create interest and not be an end. It is hoped that this sampling of the topics will generate additional interest in the profession and the broad field of forestry and encourage you to investigate further.

If you are looking for a dynamic interesting career, I could not imagine a better one than forestry. I hope you enjoy exploring these forestry topics as much as I had finding, reviewing, and eventually including them in this resource.

David Wells

January 2022

1. Deal, Robert ed. 2018 Dictionary of Forestry Bethesda MD: Society of American Foresters

History of Forestry and Natural Resource Management

American Forests: A History of Resiliency and Recovery, Douglas MacCleery, Forest History Society 2011 (The PDF download is for personal and educational use *only*, and has been made possible by funding from the U. S. Forest Service)

https://foresthhistory.org/wp-content/uploads/2016/12/American_Forests.pdf

Chapter 1: American Forests Prior to European Settlement

1. About how many acres of original forest covered the U.S.?
2. Prior to European contact were forests of the U.S. considered pristine?
3. Why did pre-European inhabitants clear the land?
4. What animal grazed along the Potomac River (Washington D.C.) in the 1600's that you wouldn't expect there today and why?
5. What was one of the first exports to Europe from the "New World"?
6. Early settlers had to clear the forest and construct buildings. What was another labor-intensive activity and why?
7. In the late 1700's what was about 2/3 of the volume of wood removed from the forest used for?

Chapter 2: Westward Expansion and Eastern Industrial Growth

1. Throughout most of the 19th century what action in the interest did the government take with regards to public domain land?
2. About what year did the amount of forest land stabilize in the U.S. at about how many (to the nearest 100 million) acres?
3. On a per-capata basis how many cords of wood were used per person per yar until the late 1800's?
4. For the early railroads what part of the operation used the most wood? How many acres of forest needed to be harvested per year to supply this part?
5. What 50-year period in U.S. history witnessed unprecedented witnessed unprecedented demand for and impact on natural resources? Why? How many square miles of forest were cleared per day?
6. Why did the South escape destructive post-logging fires that happened in the North?
7. By 1890 what had happened to the white tail deer in the U.S.?

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MacCleery, Douglas (2011). *American Forests: A History of Resiliency and Recovery*, Forest History Society (The PDF download is for personal and educational use *only*, and has been made possible by funding from the U. S. Forest Service).

Located at: https://foresthistor.org/wp-content/uploads/2016/12/American_Forests.pdf

Pacific Northwest Tree Identification

USDA Agriculture Publication 654 - Volume 1: Conifers

https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_1/vol1_table_of_contents.htm

USDA Agriculture Publication 654 - Volume 2: Broadleaves

https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_2/vol2_table_of_contents.htm

Conifer Study Questions

Douglas-fir (*Pseudotsuga menziesii*)

How would you describe the latitudinal range of Douglas-fir compared to other commercial conifers?

What disturbance created large almost pure stands of coastal Douglas-fir in the Umpqua River drainage?

What activity/ activities is maintaining the Douglas-fir in this area today?

Do older trees produce more cones? If so how much more?

Douglas-fir germination is epigeal, what does that mean?

What relationship with another organism is Douglas-fir dependent on for uptake of nutrients and water?

When (what age range) does Coastal Douglas-fir attain its highest height increments?

Western hemlock (*Tsuga heterophylla*)

Where does western hemlock thrive?

Where are the fine roots concentrated?

When are hemlock seeds ripe and when do the cones usually open?

What type of seedbed will a hemlock seed germinate on?

Ranked among forests of other species, how productive are hemlock forests?

Noble fir (*Abies procera*)

Compared to other firs how does noble fir rate?

In the Oregon Coast Range at what elevation is noble fir usually found above?

How long do seeds remain viable on the forest floor?

What is noted by foresters and scientists about the shape of the noble fir trunk (stem)?

How likely is it that a noble fir seedling can survive in a shaded environment?

Sitka spruce (*Picea sitchensis*)

How does the size of Sitka spruce compare to other spruces?

What tree is Sitka spruce associated with over much of its range?

How long can a Sitka spruce live?

What is the reported root length of a spruce root in Alaska?

Can epicormic branches develop along the stem? In what conditions?

Ponderosa pine (*Pinus ponderosa*)

What protects older, larger ponderosa pine trees from fire damage?

What animals eat ponderosa pine seeds?

How big can ponderosa pines grow?

How deep can a ponderosa pine root grow a few months after germination?

Is ponderosa pine tolerant of shade?

Western redcedar (*Thuja plicata*)

In what seasons can a western redcedar seed germinate?

Can redcedar clones be propagated by stem cuttings?

Is redcedar tolerant of growing in the shade?

Do animals browse redcedar foliage?

Broadleaf Study Questions

Bigleaf maple (*Acer macrophyllum*)

Where is most of the standing maple sawtimber located?

What are some common epiphyte species that grow on bigleaf maple?

When are most seeds disbursed?

What is considered the most important factor influencing height and stem morphology?

Does maple sprout from stumps after cutting?

Red alder (*Alnus rubra*)

Is alder the most common hardwood in the Pacific Northwest?

What is a brief description of how red alder grows?

In what soil and light conditions will alder seeds germinate?

When will stumps sprout best?

On a good site how tall can you expect an alder tree to be when 20 years old?

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USDA Agriculture Publication 654 - Volume 1: Conifers. Located at:
https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_1/vol1_table_of_contents.htm

USDA Agriculture Publication 654 - Volume 2: Broadleaves. Located at:
https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_2/vol2_table_of_contents.htm

Tree Anatomy and Physiology

Age-related Changes in Tree Growth and Physiology

https://www.fs.fed.us/psw/publications/groover/psw_2017_groover001.pdf

What are specific developmental phases that trees pass through as they age?

Does a tree have the ability to migrate?

What are two examples of how trees have evolved to fill different environmental niches?

What is different about the reproductive potential of a tree in contrast to most species?

What often dictates the life span of a tree?

What are some morphological traits that distinguish trees between their juvenile and adult forms?

How does the wood produced during a tree's juvenile stage compare to that when the tree is mature? Why might that be important?

What is one wood characteristic important if a tree is genetically capable of persisting and living for many hundreds of years?

How long can a black cottonwood (*Populus trichocarpa*) be expected to live and what is often the cause of their death?

Do trees have a programmed time of senescence?

Different tree species have predictable maximum heights why is this?

What are some biotic factors that can affect tree life span?

There are some things surprising about trees that have "extreme" life spans what are they?

How can trees migrate across a landscape?

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Groover, Andrew. 2017 Age-related Changes in Tree Growth and Physiology. eLS. 1-7 Located at: https://www.fs.fed.us/psw/publications/groover/psw_2017_groover001.pdf

Forest Policy

Forestry Issues and Public Policy

<https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/ec1200.pdf>

Oregon Society of American Foresters – Current Policy

<https://forestry.org/oregon-position-statements/>

Managing Mature and Old-Growth Forests

<https://forestry.org/wp-content/uploads/2021/09/Managing-Old-growth-FINAL-11Dec15-1.pdf>

Forest issues and Public Policy

What is “policy”?

What are the four processes used to create statewide policy?

Where is the real legislative work done?

What is one of the ballot initiatives advantages to creating policy?

How can and can't State employees be involved with initiative or ballot measures?

How can the governor influence policy making?

What is an Oregon Administrative Rule? How are they developed?

Who administers administrative rules?

What are the three state-level areas of policy of greatest concern to many family forest owners?

Is Oregon's population more or less likely to have a direct connection to or experience with forest management?

What do polls show about a majority of Oregon's residents about what are the most important values associated with forests?

What does research show about how legislators respond to a letter? What are the elements of a good letter?

How can forest owners shape forest policy?

Oregon Society of American Foresters (OSAF)

What is the professional policy of OSAF?

Managing Mature and Old-Growth Forests

What type of policy does OSAF support with regards to older forests?

Were all pre-European forests in Oregon “old growth”?

In 2003 about how many acres of old-growth were in Oregon?

What forest management practice is shown to improve health in old-growth forests?

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Bennett, Max and Adams, Paul W (Revised 2019) *Forestry Issues and Public Policy*, Oregon State University Extension Service EC 1200. Located at: <https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/ec1200.pdf>

Oregon Society of American Foresters – Current Policy, Accessed December 24, 2021. Located at:

<https://forestry.org/oregon-position-statements/>

Managing Mature and Old-Growth Forests, Position statement adopted by the Oregon Society of American Foresters Executive Committee on December 11, 2015. Accessed December 24, 2021. Located at:

<https://forestry.org/wp-content/uploads/2021/09/Managing-Old-growth-FINAL-11Dec15-1.pdf>

Landowner Goals and Constraints

A Forest Bioeconomy Framework for Canada

<https://d1ied5g1xfqpx8.cloudfront.net/pdfs/39162.pdf>

A Forest Bioeconomy Framework for Canada

What transition is seen in Canada's economy?

Why would Canada want to shift towards a bioeconomy?

What are the four pillars of Canada's Forest Bioeconomy?

Why does Canada believe they could be a global leader in the forest bioeconomy?

What (constraints) does the forest bioeconomy face?

Does Canada have enough official data on its bioeconomy?

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Canadian Council of Forest Ministers Innovation Committee. (2017) *A Forest Bioeconomy Framework for Canada*, Minister of Natural Resources, Canada. Cat no.: Fo79-23/2017E-PDF. Located at: <https://d1ied5g1xfqpx8.cloudfront.net/pdfs/39162.pdf>

Forest Disturbances

Fire FAQs, Have the size and severity of forest wildfires increased in Oregon and across the West? <https://catalog.extension.oregonstate.edu/em9194>

Has the total area burned annually by wildfire in the United States increased since the 1980s?

What is a “megafire”?

If you were investigating a wildfire to determine its severity, how could you tell the difference between a low severity fire and a high severity fire?

Where in the Pacific Northwest and northern Rockies is the percentage of high-severity wildfires not increasing?

Where in the Pacific Northwest and northern Rockies is the percentage of high-severity wildfires not increasing?

What does the term historic fire regime mean?

If you were investigating a wildfire to determine its severity, how could you tell the difference between a low severity fire and a high severity fire?

What are forest managers finding evidence of that are causing dry forests of the Southwest and Sierra Nevada to burn at a high severity during a wildfire?

In the dry forests of Southwest Oregon and the Sierra Nevada there is an increasing percentage of forests burning at high severity. How might the severity be lessened in these areas?

Where in the Pacific Northwest and northern Rockies is the percentage of high-severity wildfires not increasing?

What are forest managers finding evidence of that are causing dry forests of the Southwest and Sierra Nevada to burn at a high severity during a wildfire?

What do climate projections suggest about future wildfire trends?

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Bennett, M., Fitzgerald, S., Leavell, D., Berger, C., (Revised October 2018) *Fire FAQs, Have the size and severity of forest wildfires increased in Oregon and across the West?*, Oregon State University

Extension Publication EM 9194. Located at: <https://catalog.extension.oregonstate.edu/em9194>

Forest Health and Dynamics

Common Insect Pests and Diseases of Sitka Spruce on the Oregon Coast

<https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em9105.pdf>

Forest Dynamics <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4758377/>

An example of forest health "Common Insect Pests and Diseases of Sitka Spruce", Oregon State University

What does abiotic mean and what can an abiotic problem look like?

What are some examples of an abiotic effects on Sitka spruce?

The Sitka spruce tip weevil is a local name, what is this insect more commonly called?

How does the Sitka spruce tip weevil effect the growth of a Sitka spruce?

Some beetles bore into different parts of the tree. How can you tell the difference between these beetles and the part of the tree that they are boring into?

How can you tell if the spruce aphid is on a tree, when would you look, and what do they look like?

In coastal Oregon Sitka spruce what is the primary disease agent of concern? What are some examples?

Observing a Sitka spruce you see a butt-snap-type failure, what disease is generally associated with this failure and what is another characteristic will be visible to confirm the causal agent?

Forest dynamics, Lee Frelich, University of Minnesota Center for Forest Ecology

What type of changes are associated with forest dynamics?

Is there a difference between the terms stand development and succession and if so what is it?

As a forest develops what are the four stages it goes through?

What process generally resets stand development? (generally, not specifically)

Tree susceptibility to wind is a matter of what?

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Reeb, James E. and Shaw, David (2015) *Common Insect Pests and Diseases of Sitka Spruce on the Oregon Coast* Oregon State University

Extension Publication EM 9105. Located at:

<https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em9105.pdf>

Frelich, L. (2016) Forest dynamics (version 1; referees: 2 approved) . *F1000 Research* 2016, 5(F1000 Faculty Rev): 183 (doi:10.12688/f1000research.7412.1). Located at:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4758377/>

Forest Regions

Oregon's Forest Regions <https://oregonforests.org/content/forest-type-interactive-map>

Licenses and Attributions:

Oregon Forest Resources Institute (2021) Oregon Forest Types, interactive resource. Located at:
<https://oregonforests.org/content/forest-type-interactive-map>

Forest Measurements

Basic Forest Inventory Techniques for Family Forest Owners

<https://pubs.extension.wsu.edu/basic-forest-inventory-techniques-for-family-forest-owners>

Simple Homemade Forest Tools for Resource Inventories

https://www.blogs.nrcs.usda.gov/wps/PA_NRCSCConsumption/download?cid=nrcsep rd1288510&ext=pdf

Simple Homemade Tools for Resource Inventories – Washington State University Extension EMO38E

What is the purpose of a forest inventory?

For a Forest Stewardship Plan what are three categories of information sampled for?

What is a D-tape used for?

What is the formula for calculating the height of a tree?

What does basal area as applied to a tree measurement mean?

Basic Forest Inventory Techniques for Family Forest Owners – A Pacific Northwest Extension Publication PNW 630

A forest is comprised of individual stands. What is a stand and generally what is considered the minimum size to recognize as one?

If it's not reasonable to measure every tree in the whole forest what is another way of getting information about it?

What is pacing?

What is declination on a compass and why is it important to “set it”?

What is a helpful technique to use when navigating ground with a compass?

How many trees should you try and average in a fixed plot?

How can you tell if a tree is within a fixed plot boundary?

If you count 5 trees within a 1/20th acre fixed plot how many trees does that represent per acre?

For tree measurement sampling, does a variable plot have a specifically defined plot size? If not, what are two conditions whereby a tree is more likely to be “in”?

Under what conditions is using a variable plot generally easier than a fixed plot?

When using an angle gauge for variable plot cruising where should your eye be in relation to the plot center?

What is the standardized height for measuring a tree's diameter and what is it called?

How do you determine trees per acre (TPA) from variable plots?

What is site index?

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Zobrist, Kevin (2012) *Basic Forest Inventory Techniques for Family Forest Owners* Pacific Northwest Extension Publication PNW 630. Located at:

<https://pubs.extension.wsu.edu/basic-forest-inventory-techniques-for-family-forest-owners>

Hanley, Donald P., and Wagar, J. Alan, (2011) *Simple Homemade Forest Tools for Resource Inventories*. Washington State University Extension EM 038E. Located at:

https://www.blogs.nrcs.usda.gov/wps/PA_NRCSCconsumption/download?cid=nrcseprd1288510&ext=pdf

Silviculture

Successful Reforestation: An Overview

<https://catalog.extension.oregonstate.edu/ec1498>

Competition and Density in Woodland Stands

<https://catalog.extension.oregonstate.edu/em9206>

USDA Forest Service, Chapter 2470 Silvicultural Practices

https://www.fs.usda.gov/nfs/11558/www/nepa/110077_FSPLT3_5295786.pdf

Successful Reforestation: An Overview, S.A. Fitzgerald, Oregon State University
Extension Publication EC 1498

Why reforest?

What are the general steps involved in a typical reforestation operation?

In reforestation terms, what is a wildling?

What is one tree species more susceptible to animal browse?

In western Oregon when is the best time to plant conifer seedlings?

Competition and Density in Woodland Stands, Brad Withrow-Robinson and Doug
Maguire, Oregon State University Extension Publication EM 9206

What does competition (referring to trees) mean?

What is stand density?

Describe some tree characteristics affected by competition?

In “The Goldilocks Zone”, how are trees doing?

How could you identify a tree that has grown into the “Zone of No Return”?

USDA Forest Service Manual, Chapter 2470 – Silvicultural Practices

2470.5 Definitions

What is a clear-cut and what is the desired silvicultural outcome?

What is meant by natural recovery?

What is the difference between a salvage cut and a sanitation cut?

Silvicultural treatment refers to what type of forest management activities and what are some possible outcomes?

In uneven-aged silvicultural systems how many age classes of trees are managed for?

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Fitzgerald, Stephen A., (Revised October 2008), *Successful Reforestation: An Overview*. Oregon State University Extension publication EC 1498. Located at: <https://catalog.extension.oregonstate.edu/ec1498>

Withrow-Robinson, Brad and Maguire, Doug (2018) *Competition and Density in Woodland Stands*. Oregon State University Extension publication EM 9206. Located at: <https://catalog.extension.oregonstate.edu/em9206>

U.S. Department of Agriculture. (2014). Forest Service Manual, National Headquarters, FSM 2400 – Forest Management, Chapter 2470 – Silvicultural Practices, Section 2470.5 Definitions. Located at: https://www.fs.usda.gov/nfs/11558/www/nepa/110077_FSPLT3_5295786.pdf

Forest Harvesting

Timber Harvesting Options for Woodland Owners

<https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/ec1582.pdf>

Timber Harvesting Options for Woodland Owners, R. Parker and Sue Bowers, Oregon State University Extension Publication EC 1582

What are six objectives that a forest landowner may consider when conducting a harvest?

When planning a harvest what document should be prepared and what are some of the specifics that should be specified?

What considerations should be thought about when selecting a harvest system?

What type of terrain provides the most timber harvesting options?

Before logging operations begin what must the landowner do in Oregon?

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Parker, Bob and Bowers, Steve (2006) *Timber Harvesting Options for Woodland Owners* Oregon State University Extension publication EC 1582. Located at:
<https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/ec1582.pdf>

Forest Products

Wood Products in Our Daily Lives <https://oregonforests.org/content/products>

Softwood Lumber <https://oregonforests.org/node/117>

Engineered Wood <https://oregonforests.org/node/118>

Mass Timber Building <https://oregonforests.org/node/119>

Special Forest Products <https://oregonforests.org/node/120>

Products From Trees <https://www.wisconsincountyforests.com/education/products-from-trees/>

Wood Products in Our Daily Lives, Forest Management/ Forest Products, Oregon Forest Resources Institute

How many types of wood products are listed as “Made in Oregon”? From that list what are three that you are most familiar with?

What is the only major building material that stores carbon and where does that carbon come from?

Softwood Lumber (subheading)

What is softwood lumber made from?

Engineered Wood (subheading)

What is the difference between Cross-laminated timber (CLT) and Mass plywood panels (MPP)? Are they used in similar applications?

What type of tests are being conducted on cross-laminated timber and other engineered wood products prior to their use in mid-rise and high-rise structures?

Mass Timber Building (subheading)

What is one of Oregon’s communities that may be helped by utilizing mass timber construction in commercial construction?

Special Forest Products (subheading)

List seven types of non-timber forest products (NTFP) with commercial value that can be found in Oregon's forests.

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Wood Products in Our Daily Lives (2021) Oregon Forest Resources Institute. Located at <https://oregonforests.org/content/products>

Wisconsin County Forests Association (2013). *Products from Live Trees, Wood Chips and Sawdust, Solid Wood, Pulping of Wood, and Bark and Cork*. Located at <https://www.wisconsincountyforests.com/education/products-from-trees/>

Forest Economics

Cutting at Financial Maturity: Maximizing the Economic Return of Your Woodland

<https://content.ces.ncsu.edu/cutting-at-financial-maturity-maximizing-the-economic-return-of-your-woodland>

Financial Analysis Principles and Applications for Private Forest Lands

<https://pubs.extension.wsu.edu/financial-analysis-principles-and-applications-for-private-forest-lands>

Cutting at Financial Maturity: Maximizing the Economic Return of Your Woodland,
James Jeuck and Robert Bardon, North Carolina State Extension

What is financial maturity in respect to timber?

To estimate volume growth as a percent of annual compound interest certain information is needed. What is this information?

Financial Analysis Principles and Applications for Private Forest Lands, Kevin Zobrist,
Washington State Extension EM 030E

Starting at Assessing forestry investments, page 12

In determining discounted cash flow what time are all costs and revenues typically converted to?

What does it mean if a net present value (NPV) is positive? What does it mean if a NPV is negative? Why?

In choosing an interest rate to calculate NPV what factors should be considered to accurately reflect the investor's time value of money?

Why do some institutional investors choose forestland as part of their investment portfolio?

What does the soil expectation value (SEV) provide? How does it do it (generally/conceptionally)?

How do non-timber values effect a individual's to harvest a stand of timber or not? Can financial principles apply to non-timber values and if so, what are some of the challenges to address?

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Jeuck, James and Bardon, Robert, (2019) Cutting at Financial Maturity: Maximizing the Economic Return of Your Woodland. North Carolina Cooperative Extension publication WON-62. Located at: <https://content.ces.ncsu.edu/cutting-at-financial-maturity-maximizing-the-economic-return-of-your-woodland>

Zobrist, Ken (Revised 2021) Financial Analysis Principles and Applications for Private Forest Lands, Washington State University Extension Manual EM030 Located at: <https://pubs.extension.wsu.edu/financial-analysis-principles-and-applications-for-private-forest-lands>

Ecosystem Services

USDA Forest Service, Ecosystem Services FAQs

https://www.fs.fed.us/ecosystemservices/About_ES/faq.shtml

Caring for Our Natural Assets, An Ecosystem Services Perspective

https://www.fs.fed.us/pnw/pubs/pnw_gtr733-excerpt.pdf

Caring for Our Natural Assets, An Ecosystem Services Perspective, Sally Collins and Elizabeth Larry, USDA Forest Service PNW-GTR-733, 2007

What did Rachael Carson's book Silent Spring bring to the attention of the American public?

What are some of the benefits a forest provides and are the generally not accounted for with a financial value?

When forest land is developed or degraded is there anything lost?

For national forest managers what are the elements of ecosystem management that they are asked to consider?

How can you account for a "natural asset"? What is an example of an indicator (this is not in the reading)?

Within the ecosystem services context what might a restored ecosystem look like and how would it function?

In terms of gross domestic product (GDP) is an oil spill a good thing? What is not considered in the economic evaluation of an oil spill?

Valuing Ecosystem Services, USDA Forest Service, Frequently Asked Questions

How are ecosystem services defined?

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U.S. Department of Agriculture Forest Service, Ecosystem Services FAQs Located at: https://www.fs.fed.us/ecosystemservices/About_ES/faq.shtml

Collins Sally; Larry, Elizabeth. 2007. Caring for Our Natural Assets, An Ecosystem Services Perspective. Excerpt from PNW-GTR-733. Portland, OR: U.S. Department of Agriculture, Pacific Northwest Research Station. 11p. Located at: https://www.fs.fed.us/pnw/pubs/pnw_gtr733-excerpt.pdf

Wildlife Forest Connections

Diversifying Forest Structure to Promote Wildlife Biodiversity in Western Washington Forests <https://pubs.extension.wsu.edu/diversifying-forest-structure-to-promote-wildlife-biodiversity-in-western-washington-forests>

Diversifying Forest Structure to Promote Wildlife Biodiversity in Western Washington Forests, Kevin Zobrist and Thomas Hinckley, Washington State University Extension Publication EM044, 2012

What is wrong with the idea that some forests function as wildlife habitat and others do not?

What are five (out of a longer list) key elements of biodiversity management?

Draw a picture of vertical uniformity and vertical diversity of a forest canopy?

What is a biological legacy and what function does it have in the ecosystem?

What is a biodiversity pathway and what is the goal of implementing that system of management?

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Zobrist, Ken and Hinckley, T.M. (2012) Diversifying Forest Structure to Promote Wildlife Biodiversity in Western Washington Forests, Washington State University Extension publication EM044. Located at: <https://pubs.extension.wsu.edu/diversifying-forest-structure-to-promote-wildlife-biodiversity-in-western-washington-forests>

Forestry Careers

Find Your Path <https://oregonforests.org/pub/find-your-path>

Find Your Path, Oregon Forest Resource Institute, 2013, Updated 2019

How many jobs in Oregon are tied to the forest industry sector (as in 1 out of X)?

In the field forester section what does Joe Newton say are some hints that a forestry job may be for you?

In the forest engineer section what type of experiences and interests led Jennifer Breathe to a job in forest engineering?

In the road and right-of-way specialist section what is Eva Bailey's advice about summer jobs?

In the wildland firefighter-base manager section what two jobs early in Sean Hendrix's career we're important for building a set of experiences for his current position?

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Find Your Path (2019) Oregon Forest Resources Institute. Located at: <https://oregonforests.org/pub/find-your-path>

Urban Forestry

About Urban Forestry <https://www.portland.gov/trees/about-urban-forestry>

Urban Forests <https://www.fs.usda.gov/managing-land/urban-forests>

Urban and Community Forestry Program <https://www.fs.usda.gov/managing-land/urban-forests/ucf>

Urban Nature for Human Health and Well-Being
https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/urbannatureforhumanhealthandwellbeing_508_01_30_18.pdf

USDA Forest Service, Urban and Community Forestry Program

What is an urban or community forest?

How does the USDA Forest Service support urban and community forests?

What are some of the benefits of trees in urban settings?

City of Portland, About Urban Forestry

How many trees are in Portland, Oregon?

Which ownership category has most of the trees?

What is the name of Portland's tree code?

USDA, What are Urban Forests

How many acres are "forest" are located in the cities and towns of the United States?

Where can these sites be found?

Urban Nature for Human Health and Well-Being

In a 1984 study what did Ulrich find out about patients who had a natural view from their hospital window?

What are the positive effects associated with human health for people living near parks and with access to nature?

What is “forest bathing”?

What did the 1995 Ellis study find out about Alzheimer’s patients who had access to therapeutic or outdoor gardens?

What urban features and social conditions promote outdoor physical activity?

Why are cities generally warmer than surrounding agricultural and forested areas?

How do trees help to reduce the heat in an urban setting?

What mental benefits does time spent in nature provide?

How are children’s test scores compare to those students have access to or don’t have access to vegetative cover?

When a person is stressed what are the effects of exposure to nature? How can it be measured?

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CC licensed content based on USDA Forest Service - Urban and Community Forestry Program, City of Portland - About Urban Forestry, USDA - What are Urban Forests, and USDA Urban Nature for Human Health and Well-Being "Reading Questions" is licensed under [CC BY-NC 4.0](#)

About Urban Forestry, Urban Forestry Program, City of Portland, OR. Located at: <https://www.portland.gov/trees/about-urban-forestry>

U.S. Department of Agriculture, Forest Service, Urban Forests. Located at: <https://www.fs.usda.gov/managing-land/urban-forests>

U.S. Department of Agriculture, Forest Service, Urban and Community Forestry Program. Located at: <https://www.fs.usda.gov/managing-land/urban-forests/ucf>

U.S. Department of Agriculture, Forest Service. 2018. Urban nature for human and well-being: a research summary for communicating the health benefits of urban trees and green space. FS-1096. Washington, D.C. 24 p. Located at: https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/urbannatureforhumanhealthandwellbeing_508_01_30_18.pdf

Ethics

Principles of Ethical Conduct

<https://www.ethics.usda.gov/rules/lawsandregs/principles.htm>

Society of American Foresters Code of Ethics

<https://www.eforester.org/CodeofEthics.aspx>

ACF Code of Ethics [https://www.acf-](https://www.acf-foresters.org/ACFWeb/About_Us/Code_of_Ethics.aspx)

[foresters.org/ACFWeb/About_Us/Code_of_Ethics.aspx](https://www.acf-foresters.org/ACFWeb/About_Us/Code_of_Ethics.aspx)

USDA Office of Ethics “Principles of Ethical Conduct for Government Officers and Employees”

Executive Order 12674 of April 12, 1989 (as modified by E.O. 12731)

What type of work effort is expected of USDA employees?

True or False: Employees may use public office for private gain.

Society of American Foresters (SAF) Code of Ethics

Who are two of the figures referenced as representing the profession’s historic traditions and what are they known for?

When complying with the SAF Code of Ethics what does that represent about a member?

For what time period should foresters be thinking in for their land use decisions?

What is the foundation of the forestry profession?

If a forester heard an untrue statement about forests or forestry what should their response be and how should it be delivered?

Association of Consulting Foresters (ACF) of American, Inc. Code of Ethics

What is similar in the SAF and ACF Codes of Ethics when hearing untrue, deceptive or misleading statements?

Is it expected that ACF Consulting Foresters to be loyal to their customers?

Is receiving compensation from another party for a service previously provided to another customer allowed? What are the considerations?

When considering the pricing of a service to be completed what should be considered in that pricing (general terms)?

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CC licensed content based on USDA Principles of Ethical Conduct , Society of American Foresters Code of Ethics, and ACF Code of Ethics "Reading Questions" is licensed under [CC BY-NC 4.0](#)

U.S. Department of Agriculture, Office of Ethics, “Principles of Ethical Conduct for Government Officers and Employees”, Executive Order 12674 of April 12, 1989. Located at: <https://www.ethics.usda.gov/rules/lawsandregs/principles.htm>

Code of Ethics (2000), Society of American Foresters, Located at: <https://www.eforester.org/CodeofEthics.aspx>

Code of Ethics (2018), Association of Consulting Foresters. Located at: https://www.acf-foresters.org/ACFWeb/About_Us/Code_of_Ethics.aspx

Introduction to Forestry – Open Educational Resource

Resource Links

David Wells, Adjunct Instructor – Tillamook Bay Community College

History of Forestry and Natural Resource Management

American Forests – A History of Resiliency and Recovery https://foresthistor.org/wp-content/uploads/2016/12/American_Forests.pdf

Pacific Northwest Tree Identification and Tree Anatomy and Physiology

USDA Agriculture Publication 654 - Volume 1: Conifers

https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_1/vol1_table_of_contents.htm

USDA Agriculture Publication 654 - Volume 2: Broadleaves

https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_2/vol2_table_of_contents.htm

Age-related Changes in Tree Growth and Physiology

https://www.fs.fed.us/psw/publications/groover/psw_2017_groover001.pdf

Forest Policy and Landowner Goals and Constraints

Oregon Society of American Foresters – Current Policy

<http://www.oregon.forestry.org/oregon/policy/current-policy>

Forestry Issues and Public Policy

<https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/ec1200.pdf>

Managing Mature and Old-Growth Forests

<http://www.oregon.forestry.org/sites/default/files/Managing%20Old-growth%20-%20LOGO%20FINAL%2011Dec15.pdf>

A Forest Bioeconomy Framework for Canada

<https://d1ied5g1xfpx8.cloudfront.net/pdfs/39162.pdf>

Forest Disturbances and Health and Dynamics and Forest Regions

Common Insect Pests and Diseases of Sitka Spruce

<https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em9105.pdf>

Fire FAQs, Have the size and severity of forest wildfires increased in Oregon and across the West? <https://catalog.extension.oregonstate.edu/em9194>

Forest Dynamics <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4758377/>

Oregon's Forest Regions <https://oregonforests.org/content/forest-type-interactive-map>

Forest Measurements

Basic Forest Inventory Techniques for Family Forest Owners <https://pubs.extension.wsu.edu/basic-forest-inventory-techniques-for-family-forest-owners>

Simple Homemade Forest Tools for Resource Inventories
https://www.blogs.nrcs.usda.gov/wps/PA_NRCSCconsumption/download?cid=nrcseprd1288510&ext=pdf

Silviculture

Successful Reforestation: An Overview <https://catalog.extension.oregonstate.edu/ec1498>

Competition and Density in Woodland Stands <https://catalog.extension.oregonstate.edu/em9206>

USDA Forest Service, Chapter 2470 Silvicultural Practices
https://www.fs.usda.gov/nfs/11558/www/nepa/110077_FSPLT3_5295786.pdf

Forest Harvesting

Timber Harvesting Options for Woodland Owners
<https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/ec1582.pdf>

Forest Products and Forest Economics

Wood Products in Our Daily Lives <https://oregonforests.org/content/products>

Softwood Lumber <https://oregonforests.org/node/117>

Engineered Wood <https://oregonforests.org/node/118>

Mass Timber Building <https://oregonforests.org/node/119>

Special Forest Products <https://oregonforests.org/node/120>

Products From Trees <https://www.wisconsincountyforests.com/education/products-from-trees/>

Cutting at Financial Maturity: Maximizing the Economic Return of Your Woodland

<https://content.ces.ncsu.edu/cutting-at-financial-maturity-maximizing-the-economic-return-of-your-woodland>

Financial Analysis Principles and Applications for Private Forest Lands

<https://pubs.extension.wsu.edu/financial-analysis-principles-and-applications-for-private-forest-lands>

Ecosystem Services and Wildlife Forest Connections

Diversifying Forest Structure to Promote Wildlife Biodiversity in Western Washington Forests

<https://pubs.extension.wsu.edu/diversifying-forest-structure-to-promote-wildlife-biodiversity-in-western-washington-forests>

USDA Forest Service, Ecosystem Services FAQs

https://www.fs.fed.us/ecosystemservices/About_ES/faq.shtml

Caring for Our Natural Assets, An Ecosystem Services Perspective

https://www.fs.fed.us/pnw/pubs/pnw_gtr733-excerpt.pdf

Forestry Careers and Urban Forestry

About Urban Forestry <https://www.portland.gov/trees/about-urban-forestry>

Urban Forests <https://www.fs.usda.gov/managing-land/urban-forests>

Urban and Community Forestry Program <https://www.fs.usda.gov/managing-land/urban-forests/ucf>

Find Your Path <https://oregonforests.org/pub/find-your-path>

Urban Nature for Human Health and Well-Being

https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/urbannatureforhumanhealthandwellbeing_508_01_30_18.pdf

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Society of American Foresters Code of Ethics <https://www.eforester.org/CodeofEthics.aspx>

ACF Code of Ethics https://www.acf-foresters.org/ACFWeb/About_Us/Code_of_Ethics.aspx

Introduction to Forestry – Open Educational Resource

Supplemental Information – Labs

Week 1

History of Forests: Consider visiting a historic site preferably with many layers of historic use and using questions like these to develop an appreciation of change and history.

At Kilchis Point there are at least 3 eras represented, what are they?

What products from the forest did the indigenous people create?

Why do you think this area received as much use as it did?

What was the original vegetation likely like and how has it changed as seen in the current vegetation?

Week 2

Tree Identification: Explore an arboretum or place where there are a number of different trees and share how physical characteristics like leaf shape and bark be used to identify tree species.

Week 3

Reforestation Check: Go to a recent harvest area or mark out mythical trees using pin flags and apply the Oregon Department of Forestry stocking survey standard to see if the area is meeting reforestation requirements (Oregon). Use this to talk about forest laws and forest landowner requirements.

Reforestation Survey Method:

<https://www.oregon.gov/ODF/Documents/WorkingForests/fpastockingsurveyinstructions.pdf>

Week 4

Forest Disturbance and Dynamics: Visit a site of a past wildfire, windthrow blowdown or other area where the forest has been disturbed and use the site conditions to explore forest disturbance and dynamics.

Lab #4 - Forest Disturbance

INTRODUCTION

In this lab, we will identify and take data of three different forest disturbance types in the Noble Springs Road area.

PROCEDURE

Abiotic Disturbance – Wildfire (2020 Pike Road Fire, about 300 acres)

Wildfire is both a minor and major disturbance for many parts of Oregon, less so for the Oregon Coast. In the fire area document current vegetation using a 1/1000th acre plot (3.72' radius)

Abiotic Disturbance – Wind Damage

On the Oregon Coast wind is a concern as damage causing winds can occur more frequent than other ecosystem disturbances further inland. The 1962 Columbus Day Storm and 2007 Great Coastal Gale are examples. Describe characteristics of historic windthrow observable on the ground. What does that mean for forest management?

Biotic Disturbance – Sitka spruce tip weevil

On the Oregon Coast the Sitka spruce tip weevil (*Pissodes strobi*) infects mainly Sitka spruce (*Picea sitchensis*). The weevil kills the terminal shoot affecting future crown and stem form. The weevil affects trees growing in openings more readily and usually does not infect Sitka spruce trees over 30 to 40 feet in height. We will locate infected trees and describe your observations of the insect action. What are some preventative actions that can be taken from the reading?

LAB WRITE – UP

- Summarize your data and observations from the fire area:
 - What is your average number of trees per acre in the fire area?
 - What is your average number of shrubs per acre in the fire area?
 - What is your prediction about if the area will return to a forested condition without some intervention (for example tree planting or shrub control)?

- What are characteristics on the ground of past windthrow?

- What does Sitka spruce tip weevil activity use look like on a Sitka spruce tree? What are some suggestions to minimize damage?

- What would be some benefits to a stand if it had suffered only low or moderate damage?

- Given all three of the disturbances you looked at, what would be some forest management recommendations (three or more) that would address all three of these? For example, planted species mix. Explain some pros and con of your decisions.

Week 5

Forest Measurements: Create your own forest measurement tools using weekly reading assignment. Materials needed included something like lath to make a Biltmore Stick and hypsometer. Calculate the basal area factor of your thumb.

Visit an area with trees that are easy to measure with a clear view of the top and bottom. Measure trees as a group and individually. Discuss accuracy and precision and why different why people got different values for the same tree. Look at sources of error.

Week 6

Silviculture: Go to a stand of trees, preferably somewhat overstocked so it is easy to walk around. Use the Relative Density reading assignment to determine where the stand is in terms of density and how tree size can be manipulated by removing trees.

Week 6 Lab Assignment

Plot 1

Plot Size _____

Species	DBH	Notes:

Plot 2

Plot Size _____

Species	DBH	Notes:

Average number of trees per acre: _____

Average DBH of trees: _____

Predominant species: _____

Relative Density: _____

“Zone”?: _____

What does that mean for management of the stand?

What management pathway would get you to a stand that averaged 36” DBH?

Week 7

Forest Harvesting: Visit a forest harvest or forest road building operation, active (the best) or historic. Use the area to discuss what is going on and why. Look at stump height, logging method, how the environment is being protected.

Week 8

Forest Products: Plan a visit to a lumber mill or lumber yard. My experience is that the mill is cool, but the lumberyard provides a better opportunity to see a variety of products that are made from trees. A commercial lumberyard also has the infection controls established due to their retail-oriented business.

Week 8 – Lab Assignment

In our tour of Rosenberg Builders Supply circle products that you see made from wood on this list (from Wisconsin County Forests Association)

How many different types of products on pages 2 and 3 did you see? Wisconsin List (circle)

Was there any product that was identified as being the most expensive?

Board feet calculation, how many board feet are in a 2” x 6” board, 12 feet long?

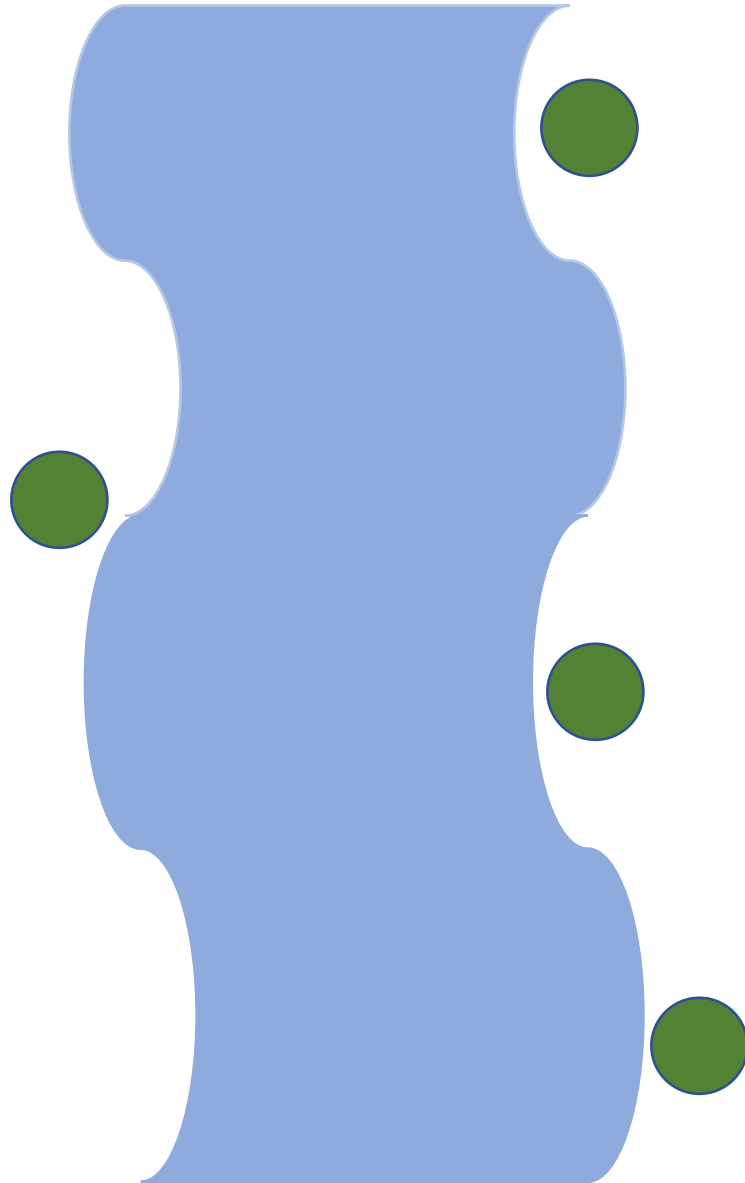
Did you see any engineered wood products? What were they?

Week 9

Ecosystem services: Our visit was to a native plant nursery operated by a conservation non-profit. Adjacent to the nursery was a historic large wood placement project to create habitat and structure in a fish bearing stream.

Large Wood Placement

Using pencils, pens or similar linear objects that can be used to represent logs create a large wood placement structure below between the two lines and describe why it looks like it does. Take a picture of it and include it as part of the assignment. The blue represents the water (bank full width) and the green dots existing trees.



What were the steps used at the nursery to grow trees and shrubs?

What problems did the nursery have growing in propagating a plant ready for planting? How were these problems overcome?

What is your favorite plant that you saw and why?

Week 10

Urban Forestry: Find a tree city and use the streets and parks to discuss how trees can be incorporated into an urban setting. Discuss size of trees appropriate in different locations like under powerlines and maintenance issues of fallen leaves and storm drains.

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Oregon Department of Forestry, Forest Practices Program, Reference #5, Reforestation Stocking Survey Procedures. October 31, 1994, Revised April 16, 2007; Located at: <https://www.oregon.gov/ODF/Documents/WorkingForests/fpastockingsurveyinstructions.pdf>

Introduction to Forestry – Open Educational Resource

Supplemental Information – Study Question Answer Key

History of Forestry and Natural Resource Management

Chapter 1: American Forests Prior to European Settlement

1. About how many acres of original forest covered the U.S.? **About one billion acres (pp1)**
2. Prior to European contact were forests of the U.S. considered pristine? **No, they were often strongly influenced by native people (pp3)**
3. Why did pre-European inhabitants clear the land? **For crops, improve game habitat, facilitate travel, reduce insect pests, remove cover for potential enemies, enhance conditions for berries and drive game (pp3)**
4. What animal grazed along the Potomac River (Washington D.C.) in the 1600's that you wouldn't expect there today and why? **Bison, because of grass and forbs created by fire (pp 3-5)**
5. What was one of the first exports to Europe from the "New World"? **Lumber, including ship masts and naval stores (pp 6)**
6. Early settlers had to clear the forest and construct buildings. What was another labor-intensive activity and why? **Building fences, to keep the farm animals out of the garden (pp 8)**
7. In the late 1700's what was about 2/3 of the volume of wood removed from the forest used for? **The wood was used as a source of energy, home heating and industrial operations (pp 10)**

Chapter 2: Westward Expansion and Eastern Industrial Growth

1. Throughout most of the 19th century what action, in the national interest, did the government take with regards to public domain land? **To transfer the public domain lands to private ownership (pp 13)**
2. About what year did the amount of forest land stabilize in the U.S. at about how many (to the nearest 100 million) acres? **1920, and the amount of forestland stabilized about 800 million acres. (pp 14 – graph)**
3. On a per-capata basis how many cords of wood were used per person per year until the late 1800's? **More than 4 cords per year (pp 16)**

4. For the early railroads what part of the operation used the most wood? How many acres of forest needed to be harvested per year to supply this part? **For crossties which consumed between 15 and 20 million acres of forest in 1900. (pp 19)**
5. What 50-year period in U.S. history witnessed unprecedented demand for and impact on natural resources? Why? How many square miles of forest were cleared per day? **The five decades between 1850 and 1900 because of increasing population, farming and industrial growth. About 13.5 square miles of forest were cleared per day. (pp 19 & 12)**
6. Why did the South escape destructive post-logging fires that happened in the North? **Because the southern farmers continued the native practice of burning the woods, which reduced undergrowth and fuel buildup (pp 22)**
7. By 1890 what had happened to the white tail deer in the U.S.? **The deer had been overhunted and eliminated from much of its range east of the Mississippi. (pp 22)**

Pacific Northwest Tree Identification

USDA Agriculture Publication 654 - Volume 1: Conifers

Douglas-fir (*Pseudotsuga menziesii*)

How would you describe the latitudinal range of Douglas-fir compared to other commercial conifers? **The greatest of any commercial conifer species in western North America (pp 1/21)**

What disturbance created large almost pure stands of coastal Douglas-fir in the Umpqua River drainage? **Periodic recurrence of catastrophic wildfires (pp 5/21)**

What activity/ activities is maintaining the Douglas-fir in this area today? **Clearcut harvests and slash burning (pp 5/21)**

Do older trees produce more cones? If so how much more? **Yes, old-growth trees may produce 20 to 30 times the number of cones per hectare. (pp 8/21)**

Douglas-fir germination is epigeal, what does that mean? **That the germination of the plant takes place above the ground.**

What relationship with another organism is Douglas-fir dependent on for uptake of nutrients and water? **Mycorrhizal fungi (pp 9/21)**

When (what age range) does Coastal Douglas-fir attain its highest height increments? **Between 20 and 30 years of age (pp 10/21)**

Western hemlock (*Tsuga heterophylla*)

Where does western hemlock thrive? **In a mild, humid climate where frequent fog and precipitation occur during the growing season (pp 2/17)**

Where are the fine roots concentrated? **Commonly, just below the organic horizon (pp 3/17)**

When are hemlock seeds ripe and when do the cones usually open? **Seeds are usually ripe by mid-September to late September and the cones do not open until late October (pp 6/17)**

What type of seedbed will a hemlock seed germinate on? **The seeds will germinate on both organic and mineral seedbeds (pp 7/17)**

Ranked among forests of other species, how productive are hemlock forests? **They are among the most productive forests in the world (pp 10/17)**

Noble fir (*Abies procera*)

Compared to other firs how does noble fir rate? **It obtains the largest dimensions (pp 1/12)**

In the Oregon Coast Range at what elevation is noble fir usually found above? **Generally above 3,000 feet (pp 3/12)**

How long do seeds remain viable on the forest floor? **For one season (only) (pp 5/12)**

What is noted by foresters and scientists about the shape of the noble fir trunk (stem)? **A high "form class", small amount of taper. (pp 7/12)**

How likely is it that a noble fir seedling can survive in a shaded environment? **It would not likely survive, as the species is shade intolerant (needs sun) (pp 8/12)**

Sitka spruce (*Picea sitchensis*)

How does the size of Sitka spruce compare to other spruces? **It is the largest of the world's spruces (pp 1/12)**

What tree is Sitka spruce associated with over much of its range? **Western hemlock (pp 4/12)**

How long can a Sitka spruce live? **700 to 800 years (pp 6/12)**

What is the reported root length of a spruce root in Alaska? **Lateral roots up to 75 feet in length (pp 7/12)**

Can epicormic branches develop along the stem? In what conditions? **Yes, unlike most conifers when the stem is exposed to the sun (pp7/12)**

Ponderosa pine (*Pinus ponderosa*)

What protects older, larger ponderosa pine trees from fire damage? **Thick bark (pp 4/19)**

What animals eat ponderosa pine seeds? **Many birds, and small mammals such as mice, chipmunks, and tree squirrels (pp 6/19)**

How big can ponderosa pines grow? **Impressive sizes, 103.5 inches in DBH and 232 feet height (pp 8/19)**

How deep can a ponderosa pine root grow a few months after germination? **The roots can go down 20 inches (pp 9/19)**

Is ponderosa pine tolerant of shade? **No, the species is considered intolerant of shade (pp 10/19)**

Western redcedar (*Thuja plicata*)

In what seasons can a western redcedar seed germinate? **Where moisture and temperature are favorable, germination can occur in autumn, winter or spring (pp 7/16)**

Can redcedar clones be propagated by stem cuttings? **Yes, they are easily propagated by the rooting of stem cuttings (pp 8/16)**

Is redcedar tolerant of growing in the shade? **Yes, it is very tolerant of shade (pp 9/16)**

Do animals browse redcedar foliage? **Yes, often severely by deer, elk or rodents (pp 11/16)**

USDA Agriculture Publication 654 - Volume 2: Broadleaves

Bigleaf maple (*Acer macrophyllum*)

Where is most of the standing maple sawtimber located? **In Washington and Oregon (pp 1/14)**

What are some common epiphyte species that grow on bigleaf maple? **Club moss, moss, lichens, and licorice fern (pp 4/14)**

When are most seeds disbursed? **Most are dispersed by the wind between October and January (pp 5/14)**

What is considered the most important factor influencing height and stem morphology? **Browsing by deer (pp 9/14)**

Does maple sprout from stumps after cutting? **Yes, the stumps sprout profusely (pp 9/14)**

Red alder (*Alnus rubra*)

Is alder the most common hardwood in the Pacific Northwest? **Yes (pp 1/13)**

What is a brief description of how red alder grows? **It is a relatively short-lived, intolerant pioneer with rapid juvenile growth (pp 1/13)**

In what soil and light conditions will alder seeds germinate? **On moist mineral soil with full sunlight (pp 4/13)**

When will stumps sprout best? **When the trees are cut in winter and when the stump height exceeds 4 inches (pp 5/13)**

On a good site how tall can you expect an alder tree to be when 20 years old? **79 feet (pp 5/13)**

Tree Anatomy and Physiology

Age-related Changes in Tree Growth and Physiology

What are specific developmental phases that trees pass through as they age? **Juvenile to adult vegetative, vegetative to reproductive (pp 1)**

Does a tree have the ability to migrate? **Yes, by the dispersal of seed (pp 5)**

What are two examples of how trees have evolved to fill different environmental niches? **Black cottonwood pioneers new habitats after flooding by wind distributed seed that can germinate and then rapidly grow on a sandbar, Longleaf pine in a area prone to frequent fires by having a grass stage growing a tap root and then sprouting up. (pp 3)**

What is different about the reproductive potential of a tree in contrast to most species? **The reproductive potential increases with age and size (pp 1)**

What often dictates the life span of a tree? **Size-related stress, abiotic stress, pathogens, or rot-inducing fungi (pp 1)**

What are some morphological traits that distinguish trees between their juvenile and adult forms? **Leaf shapes, presence of thorns, and bark textures (pp 1)**

How does the wood produced during a trees juvenile stage compare to that when the tree is mature? Why might that be important? **Generally lower density, shorter cell lengths, and higher cellulose microfibril angle so the tree is more flexible allowing smaller stems to tolerate wind (pp 2)**

What is one wood characteristic important if a tree is genetically capable of persisting and living for many hundreds of years? **Rot resistance (pp 3)**

How long can a black cottonwood (*Populus trichocarpa*) be expected to live and what is often the cause of their death? **Generally not more than 100 years, by rot-inducing fungi that weaken the stem (pp 3)**

Do trees have a programmed time of senescence? **No (pp 3)**

Different tree species have predictable maximum heights why is this? **It is strongly influenced by species-specific characteristics associated with the anatomy and physiology of water-conducting secondary xylem (wood). (pp 4)**

What are some biotic factors that can affect tree life span? **Insects and pathogens (pp 4)**

There are somethings surprising about trees that have “extreme” life spans what are they? **The occupy dry, harsh environments (pp 4)**

How can trees migrate across a landscape? **By the dispersal of seed and “assisted” migration by people (pp 5)**

Forest Policy

Forest issues and Public Policy, Oregon State University

What is “policy”? **An agreed-on course of action taken to achieve an objective (pp 1)**

What are the four processes used to create statewide (Oregon) policy? **Legislation, ballot initiative, executive powers, and agency rule (pp 2)**

Where is the real legislative work done? **In committee (pp 2)**

What is one of the ballot initiatives advantages to creating policy? **Allows for grassroots democracy and can address controversial issues (pp 3)**

How can and can't State employees be involved with initiative or ballot measures? **State employees cannot advocate for or against an initiative or ballot measure. They can provide factual information. (pp 4)**

How can the governor influence policy making? **By appointing Board Members, issuing Executive Orders and proposing legislation and vetoing legislation. (pp 4)**

What is an Oregon Administrative Rule? How are they developed? **A how-to directive based on statute that are developed by agency or board (pp 4)**

Who administers administrative rules? **The agency (pp 5)**

What are the three state-level areas of policy of greatest concern to many family forest owners? **Forest Practices Rules, land use laws and taxation (pp 6-8)**

Is Oregon's population more or less likely to have a direct connection to or experience with forest management? **Less likely (pp 11)**

What do polls show about a majority of Oregon's residents about what are the most important values associated with forests? **Non-timber values (clean water, fish and wildlife protection) (pp 11)**

What does research show about how legislators respond to a letter? What are the elements of a good letter? **That they respond to a letter. The letter should focus on a single issue, be short and to the point and be based on your experiences, observations and data. (pp 13)**

How can forest owners shape forest policy? **Yes (pp 12)**

Oregon Society of American Foresters (OSAF)

What is the professional policy of OSAF? **Professionals advancing the science, education, technology, and practice of forestry for the benefit of society.**

Managing Mature and Old-Growth Forests

What type of policy does OSAF support with regards to older forests? **Policies that effectively reflect the diverse and dynamic nature of forest ecosystems, such as a targeted mix of younger and older forests across the landscape rather than artificially fixed in specific locations.**

Were all pre-European forests in Oregon “old growth”? **No**

In 2003 about how many acres of old-growth were in Oregon? **Approximately 6.5 million acres**

What forest management practice is shown to improve health in old-growth forests? **Thinning smaller or younger trees.**

Landowner Goals and Constraints

A Forest Bioeconomy Framework for Canada

What transition is seen in Canada’s economy? **A transition toward a low-carbon, sustainable economy (pp 2)**

Why would Canada want to shift towards a bioeconomy? **To meet Canada’s greenhouse gas emission reduction targets under the Paris Agreement. (pp 2)**

What are the four pillars of Canada’s Forest Bioeconomy? **Communities and Relationships, Supply of Forest Resources and Advanced Bioproducts, Demand for Advanced Forest Bioproducts and Services, and Support for Innovation (pp 2-3)**

Why does Canada believe they could be a global leader in the forest bioeconomy? **Because of their combination of biomass availability and technical capacity (pp 4)**

What (constraints) does the forest bioeconomy face? **Competition to attract new graduates and talent (pp 20)**

Does Canada have enough official data on its bioeconomy? **The amount of current data is considered limited (pp 23)**

Forest Disturbances

Fire FAQs: Have the size and severity of forest wildfires increased in Oregon and across the West?

Has the total area burned annually by wildfire in the United States increased since the 1980s? **Yes, nine of the 10 years with the most acreage burned have occurred since 2000 (pp 1)**

What is a “megafire”? **A mega fire is a very large fire (pp 1)**

If you were investigating a wildfire to determine its severity, how could you tell the difference between a low severity fire and a high severity fire? **In a low severity fire less than 25% of the overstory trees are killed and the soils effect is limited. In a high severity fire more than 75% of the overstory trees are killed and/or there is extensive mineral soil exposure (pp 1)**

Where in the Pacific Northwest and northern Rockies is the percentage of high-severity wildfires not increasing? **In the moist forests of both regions (pp 1)**

What does the term historic fire regime mean? **The spatial pattern, intensity and frequency of occurrence in which fires naturally occur over time in a particular region (pp 1)**

What are forest managers finding evidence of that are causing dry forests of the Southwest and Sierra Nevada to burn at a high severity during a wildfire? **Fuel build-up as a result of fire exclusion (pp 1)**

In the dry forests of Southwest Oregon and the Sierra Nevada there is an increasing percentage of forests burning at high severity. How might the severity be lessened in these areas? **Reducing the fuel loading on forest lands**

What do climate projections suggest about future wildfire trends? **That the trend toward larger patch size and high-severity fires will accelerate. (pp 2)**

Forest Health and Dynamics

“Common Insect Pests and Diseases of Sitka Spruce”, Oregon State University

What does abiotic mean and what can an abiotic problem look like? **Nonliving or nonbiological that can yellow needles (pp 3-4)**

What are some examples of an abiotic effects on Sitka spruce? **Epicormic branching, root damage that can cause crown loss, windthrow (pp 3-5)**

The Sitka spruce tip weevil is a local name, what is this insect more commonly called? **White pine weevil (pp 6)**

How does the Sitka spruce tip weevil effect the growth of a Sitka spruce? **Infests and kills the leader of the tree and slows growth and produces severe stem deformations (pp 6)**

Some beetles bore into different parts of the tree. How can you tell the difference between these beetles and the part of the tree that they are boring into? **Ambrosia beetles bore into the sap wood and create white dust and Spruce beetles bore into the bark and create reddish-brown sawdust. (pp 7-8)**

How can you tell if the spruce aphid is on a tree, when would you look, and what do they look like? **Tap or beat the branches over a white sheet of paper. The aphids are green (or olive-green) (pp 9)**

In coastal Oregon Sitka spruce what is the primary disease agent of concern? What are some examples? **Fungi, like Heterobasidion root and butt rot, Armillaria root rot, Schweinitzii root and butt rot, red belt fungus and red-ring rot (pp 12-15)**

Observing a Sitka spruce you see a butt-snap-type failure, what disease is generally associated with this failure and what is another characteristic will be visible to confirm the causal agent? **Schweimitzii root and butt rot and a fungal body that looks like a “cow-pie”. (pp 14)**

Forest dynamics, Lee Frelich, University of Minnesota Center for Forest Ecology

What type of changes are associated with forest dynamics? **Stand structure, species composition, and species intractions. (pp 1)**

Is there a difference between the terms stand development and succession and if so what is it? **Stand development is a directional change in structure over time and succession is directional change in species composition. (pp 2)**

As a forest develops what are the four stages it goes through? **Stand initiation, stem exclusion, understory re-initiation, and multi-aged stage (old growth) pp 3)**

What process generally resets stand development? (generally, not specifically) **A disturbance (pp 3)**

Tree susceptibility to wind is a matter of what? **Wood strength, wood flexibility, tree growth form and ability to streamline in the wind (pp 4)**

Forest Regions

Oregon's Forest Regions

Forest Measurements

Simple Homemade Tools for Resource Inventories – Washington State University Extension EMO38E

What is the purpose of a forest inventory? **To assess the needs of a forest and plan for the future (pp 2)**

For a Forest Stewardship Plan what are three categories of information sampled for? **Tree density, stocking levels and species (pp 3)**

What is a D-tape used for? **To measure the diameter of a tree (pp 3)**

What is the formula for calculating the height of a tree? **Once the angle to the top of the tree and the horizontal distance to the tree have been determined the height is calculated by: height = distance x Tangent of the angle to the top of the tree (pp 6)**

What does basal area as applied to a tree measurement mean? **It is the cross-sectional area of a tree at 4.5 feet above ground. (pp 10)**

Basic Forest Inventory Techniques for Family Forest Owners – A Pacific Northwest Extension Publication PNW 630

A forest is comprised of individual stands. What is a stand and generally what is considered the minimum size to recognize as one? **A stand is a distinct, recognizable area of the forest that is likely to be managed as a unit. Generally, three acre minimum. (pp 6)**

If it's not reasonable to measure every tree in the whole forest what is another way of getting information about it? **Sampling (pp 9)**

What is pacing? **Counting your steps, a method of measuring distance (pp 13)**

What is declination on a compass and why is it important to “set it”? **It is the difference between true north and magnetic north and setting it will orient you to true north. (pp 14)**

What is a helpful technique to use when navigating ground with a compass? **Sight to an object and walk towards it and then sight towards another object. (pp 15)**

How many trees should you try and average in a fixed plot? **5 to 10 trees (pp 17)**

How can you tell if a tree is within a fixed plot boundary? **If the center of the tree or more is within the boundary (pp 18)**

If you count 5 trees within a 1/20th acre fixed plot how many trees does that represent per acre? **100 trees (pp 18)**

For tree measurement sampling, does a variable plot have a specifically defined plot size? If not, what are two conditions whereby a tree is more likely to be “in”? **No. The larger the trunk size and closeness to the plot center. (pp 20)**

Under what conditions is using a variable plot generally easier than a fixed plot? **When you are working alone, steep slopes and in brush (pp 20)**

When using an angle gauge for variable plot cruising where should your eye be in relation to the plot center? **Your eye should be over the plot center (pp 21)**

What is the standardized height for measuring a tree’s diameter and what is it called? **4 ½ feet above the ground measured on the uphill side of the tree (pp 23)**

How do you determine trees per acre (TPA) from variable plots? **It is a little more complicated (pp 33)**

- For each tree determine the basal area
- Divide the basal area factor by the basal area of each tree to get the trees per acre represented by that tree
- Add up the trees per acre

What is site index? **It is a measure of the productivity of the site, based on how tall a tree will grow in a specified period of time (pp 35)**

Silviculture

Successful Reforestation: An Overview, S.A. Fitzgerald, Oregon State University Extension Publication EC 1498

Why reforest? In Oregon it is the law. Depending on site productivity 100 to 200 trees per acre must be established (pp 1)

What are the general steps involved in a typical reforestation operation? Preparing the planting site, obtaining suitable seedlings, planting seedlings, plantation maintenance, and financing reforestation activities (pp 1)

In reforestation terms, what is a wildling? A seedling growing in the wild (pp 3)

What is one tree species more susceptible to animal browse? Western redcedar (pp 4)

In western Oregon when is the best time to plant conifer seedlings? From January through March (pp 5)

Competition and Density in Woodland Stands, Brad Withrow-Robinson and Doug Maguire, Oregon State University Extension Publication EM 9206

What does competition (referring to trees) mean? It means that the amount of resources needed to support plant growth (light, moisture, or nutrients) is limited. (pp 2)

What is stand density? Is a measure of the number of trees and how fully the trees occupy a site. (pp 2)

Describe some tree characteristics affected by competition? Competition has an effect on growth, health, resiliency and character of a woodland. (pp 3)

In “The Goldilocks Zone”, how are trees doing? It is considered the “optimum growth zone” a zone of tree growth is robust and trees are resistant to stress and pests. (pp 4)

How could you identify a tree that has grown into the “Zone of No Return”? Trees will be small and skinny with small crowns. (pp 4)

USDA Forest Service Manual, Chapter 2470 – Silvicultural Practices

2470.5 Definitions

What is a clear-cut and what is the desired silvicultural outcome? **A stand in which essentially all trees have been removed to produce an even aged stand. (pp 11/58)**

What is meant by natural recovery? **The use of natural processes to revegetate an area after a natural disturbance and the acceptance of resulting conditions, even though it may take years to attain stocked forested conditions. (pp 11/58)**

What is the difference between a salvage cut and a sanitation cut? **In a salvage cut trees are removed due to injurious agents other than competition, to recover value that would otherwise be lost. In a sanitation cut trees are removed to improve stand health by stopping or reducing actual or anticipated spread of insects and disease. (pp 15/58)**

Silvicultural treatment refers to what type of forest management activities and what are some possible outcomes? **Is a forest management activity such as thinning, harvesting, planting, pruning, prescribed burning and site preparation that is designed to alter the establishment, growth, composition, health, and quality of forests to meet the needs and values of landowners on a sustainable basis. (pp 17/58)**

In uneven-aged silvicultural systems how many age classes of trees are managed for? **Three or more age classes (pp 18/58)**

Forest Harvesting

Timber Harvesting Options for Woodland Owners, R. Parker and Sue Bowers, Oregon State University Extension Publication EC 1582

What are six objectives that a forest landowner may consider when conducting a harvest? **Maximize financial return from the stand, improve stand vigor, growth, and yield and product quality, protect streams and water quality, minimize damage to residual trees, enhance wildlife habitat, enhance recreation opportunities (pp 1)**

When planning a harvest what document should be prepared and what are some of the specifics that should be specified? **A well written contract that specifies the equipment and methods for attaining the desired objectives. (pp 1)**

What considerations should be thought about when selecting a harvest system? **Characteristics of the harvest site, particularly timber size and site topography. (pp 2)**

What type of terrain provides the most timber harvesting options? **Gentle terrain generally provides the most options (pp 3)**

Before logging operations begin what must the landowner do in Oregon? **Contact the Oregon Department of Forestry and file a Notifications of Operations (pp 7)**

Forest Products

Wood Products in Our Daily Lives, Forest Management/ Forest Products, Oregon Forest Resources Institute

How many types of wood products are listed as “Made in Oregon”? From that list what are three that you are most familiar with? **Eleven (11) ie softwood lumber, plywood, hardwood lumber and plywood (pp 3/11)**

What is the only major building material that stores carbon and where does that carbon come from? **Wood the gets its carbon from the atmosphere where trees grow. (pp 4/11)**

Softwood Lumber (subheading)

What is softwood lumber made from? **From a conifer tree species like Douglas-fir**

Engineered Wood (subheading)

What is the difference between Cross-laminated timber (CLT) and Mass plywood panels (MPP)? Are they used in similar applications? **CLT is made by adhering dimension lumber into large panels. MPP is like regular plywood just much thicker and bigger. CLT and MPP can be used in similar applications.**

What type of tests are being conducted on cross-laminated timber and other engineered wood products prior to their use in mid-rise and high-rise structures? **Fire and seismic testing**

Mass Timber Building (subheading)

What is one of Oregon’s communities that may be helped by utilizing mass timber construction in commercial construction? **Rural communities**

Special Forest Products (subheading)

List seven types of non-timber forest products (NTFP) with commercial value that can be found in Oregon’s forests. **Wild floral greens, evergreen boughs, mushrooms, berries, cascara bark, native seed, forest transplants**

Forest Economics

Cutting at Financial Maturity: Maximizing the Economic Return of Your Woodland, James Jeuck and Robert Bardon, North Carolina State Extension

What is financial maturity in respect to timber? **Is when the rate of value increase of the trees (timber) equals an alternative investment's rate of return. (pp 1)**

To estimate volume growth as a percent of annual compound interest certain information is needed. What is this information? **The average age of the trees, the average 10-year diameter growth, the average DBH, and site productivity (pp 3-4)**

Financial Analysis Principles and Applications for Private Forest Lands, Kevin Zobrist, Washington State Extension EM 030E

Starting at Assessing forestry investments, page 12

In determining discounted cash flow what time are all costs and revenues typically converted to? **They are all discounted back to the present time. (pp 12)**

What does it mean if a net present value (NPV) is positive? What does it mean if a NPV is negative? Why? **If a NPV is positive then the present values of the revenue exceeds the present value of the costs and the investment can be considered financially acceptable. In the NPV is negative the present value of the costs exceeds the present values of the revenues and the investment is considered financially unacceptable. (pp 13)**

In choosing an interest rate to calculate NPV what factors should be considered to accurately reflect the investor's time value of money? **The borrowing interest rate, what alternate investments are paying, risk (pp 14)**

Why do some institutional investors choose forestland as part of their investment portfolio? **An immunity to most market shifts and continued biological growth (pp 17)**

What does the soil expectation value (SEV) provide? How does it do it (generally/conceptionally)? **An economic value of bare land by summing all the costs and revenues and converting them to a present value. (pp 20)**

How do non-timber values effect a individual's to harvest a stand of timber or not? Can financial principles apply to non-timber values and if so, what are some of the challenges to address? **If non-timber values are high enough, it may never make sense to harvest. Yes, financial methods can be used but the values to use can be difficult to determine. (pp 26)**

Ecosystem Services

Caring for Our Natural Assets, An Ecosystem Services Perspective, Sally Collins and Elizabeth Larry, USDA Forest Service PNW-GTR-733, 2007

What did Rachael Carson's book Silent Spring bring to the attention of the American public? **A broad awareness of human life as part of the environment. (pp 2)**

What are some of the benefits a forest provides that are generally not accounted for with a financial value? **Storing carbon, water, erosion control, natural hazard regulation, and cultural fulfillment (pp 2)**

When forest land is developed or degraded is there anything lost? **A range of goods and services like water purification. (pp 3)**

For national forest managers what are the elements of ecosystem management that they are asked to consider? **The ecological potential of a landscape, economic, technical, and human needs and requirements. (pp 5)**

How can you account for a "natural asset"? What is an example of an indicator (this is not in the reading)? **Measuring the stocks and flows of ecosystem services. The spotted owl (pp 6)**

Within the ecosystem services context what might a restored ecosystem look like and how would it function? **It might not look like the original landscape but will be a healthy, productive system capable of meeting societal needs for a broad array of ecosystem services. (pp 6)**

In terms of gross domestic product (GDP) is an oil spill a good thing? What is not considered in the economic evaluation of an oil spill? **Yes, because of the cost of clean-up. This method does not consider the ecological damage**

Valuing Ecosystem Services, USDA Forest Service, Frequently Asked Questions

How are ecosystem services defined? **Ecosystem services are commonly defined as the benefits people obtain from ecosystems.**

Wildlife Forest Connections

Diversifying Forest Structure to Promote Wildlife Biodiversity in Western Washington Forests, Kevin Zobrist and Thomas Hinckley, Washington State University Extension Publication EM044, 2012

What is wrong with the idea that some forests function as wildlife habitat and others do not? **All forests provide some level of habitat, a better question is how much habitat and for what species (pp 1)**

What are five (out of a longer list) key elements of biodiversity management? **Repeated thinning, gap creation, promoting species diversity, maintaining hardwood patches, promoting mast producing species. (pp 2)**

Draw a picture of vertical uniformity and vertical diversity of a forest canopy?

What is a biological legacy and what function does it have in the ecosystem? **It is an element of the pre-harvest stand left to enrich the regeneration post-harvest stand. (pp 7)**

What is a biodiversity pathway and what is the goal of implementing that system of management? **The goal of biodiversity pathway management is to promote and accelerate the development of old forest structure. (pp 9)**

Forestry Careers

Find Your Path, Oregon Forest Resource Institute, 2013, Updated 2019

How many jobs in Oregon are tied to the forest industry sector (as in 1 out of X)? **1 out of 20 jobs (pp 3)**

In the field forester section what does Joe Newton say are some hints that a forestry job may be for you? **Like spending time outside (pp 4)**

In the forest engineer section what type of experiences and interests led Jennifer Breathe to a job in forest engineering? **Surveying, marking trees, firefighting, timber cruising, and a love of the outdoors (pp 7)**

In the road and right-of-way specialist section what is Eva Bailey's advice about summer jobs? **Try different jobs to get a feel for what the range of work is like (pp 10)**

In the wildland firefighter-base manager section what two jobs early in Sean Hendrix's career we're important for building a set of experiences for his current position? **Firefighting and tree planting (pp 16)**

Urban Forestry

USDA Forest Service, Urban and Community Forestry Program

What is an urban or community forest? **An urban or community forest is the aggregate of all public and private vegetation and green space within a community that provide a myriad of environmental, health and economic benefits**

How does the USDA Forest Service support urban and community forests? **They can help perform tree inventories, prepare management plans and train staff and residents how to plant and care for trees.**

What are some of the benefits of trees in urban settings? **Increasing property values and energy cost savings**

City of Portland, About Urban Forestry

How many trees are in Portland, Oregon? **About 4.3 million trees**

Which ownership category has most of the trees? **Private property**

What is the name of Portland's tree code? **Title 11 Trees**

USDA, What are Urban Forests

How many acres are "forest" are located in the cities and towns of the United States?
141 million acres

Where can these sites be found? **Urban parks, street trees, landscaped boulevards, gardens, greenways, river corridors, wetlands, nature preserves, shelter belts of trees**

Urban Nature for Human Health and Well-Being

In a 1984 study what did Ulrich find out about patients who had a natural view from their hospital window? **They spent fewer days in the hospital and used fewer pain medications (pp 1)**

What are the positive effects associated with human health for people living near parks and with access to nature? **Less mental distress, are more physically active, and extended life spans (pp 2)**

What is “forest bathing”? **Meditative walks through the woods (pp 13)**

What did the 1995 Ellis study find out about Alzheimer’s patients who had access to therapeutic or outdoor gardens? **They exhibited fewer disruptive or agitated behaviors (pp 16)**

What urban features and social conditions promote outdoor physical activity? **Street design with connectivity, walking and biking infrastructure, safety from crime, safety from traffic incentive programs (pp 8)**

Why are cities generally warmer than surrounding agricultural and forested areas? **Due to the dominance of impervious surfaces and energy absorbing materials (pp 4)**

How do trees help to reduce the heat in an urban setting? **They provide micro-cooling through evapotranspiration and shade (pp 5)**

What mental benefits does time spent in nature provide? **Increased cognitive performance and well-being and alleviation of mental health illnesses like depression, attention deficit disorder and Alzheimer’s (pp 10)**

How are children’s test scores compare to those students have access to or don’t have access to vegetative cover? **Higher scores on standardized tests are associated with more trees and vegetation (pp 12)**

When a person is stressed what are the effects of exposure to nature? How can it be measured? **Views of nature can reduce stress which can be measured with lower blood pressure, muscle tension and pulse rate. (pp 14)**

Ethics

USDA Office of Ethics “Principles of Ethical Conduct for Government Officers and Employees”

Executive Order 12674 of April 12, 1989 (as modified by E.O. 12731)

What type of work effort is expected of USDA employees? **That they shall put forth honest effort in the performance of their duties.**

True or False: Employees may use public office for private gain. **False**

Society of American Foresters (SAF) Code of Ethics

Who are two of the figures referenced as representing the profession’s historic traditions and what are they known for? **Gifford Pinchot, for conservation and Aldo Leopold for the land ethic**

When complying with the SAF Code of Ethics what does that represent about a member? **Care and respect for the land and the commitment to the long-term management of ecosystems and ensures just and honorable professional and human relationships, mutual confidence and respect and competent service to society.**

For what time period should foresters be thinking in for their land use decisions? **Current and future generations**

What is the foundation of the forestry profession? **Sound science**

If a forester heard an untrue statement about forests or forestry what should their response be and how should it be delivered? **Challenge and correct the untrue statement in a civil and dignified manner.**

Association of Consulting Foresters (ACF) of American, Inc. Code of Ethics

What is similar in the SAF and ACF Codes of Ethics when hearing untrue, deceptive or misleading statements? **That the statement will be challenged and corrected**

Is it expected that ACF Consulting Foresters to be loyal to their customers? **Yes**

Is receiving compensation from another party for a service previously provided to another customer allowed? What are the considerations? **No, without the full disclosure, knowledge and written consent of all parties concerned**

When considering the pricing of a service to be completed what should be considered in that pricing (general terms)? **Appropriate and adequate compensation**