SOCIETY OF AMERICAN FORESTERS

Western Forester

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Welcome to Oregon

A special note from the Oregon Society of American Foresters

Dear National Convention Attendee,

On behalf of the Oregon Society of American Foresters, welcome to Oregon and the National Convention! We are so glad that you're here. It is our honor and privilege to host you. Here in the Pacific Northwest we are ForestProud and we couldn't be more excited to share our enthusiasm for forestry with all of you.

Our first step toward welcoming you to the Pacific Northwest is to provide you with a copy of the *Western Forester* (WF). The *Western Forester* is a product of the Society of American Foresters Northwest Office, a partnership between the Oregon, Washington, Alaska, and Inland Empire Societies. The group works together on common issues around forestry within our geographic region. The WF is our main product and we wanted you all to have a copy. This issue focuses on silviculture within our four-state region. We hope you enjoy! We are thankful to Green Diamond Resource Company for funding the printing of the extra copies for everyone at Convention.

We hope you will take advantage of all Portland has to offer while you're here. As the host society, we are excited and willing to help you find places to explore beyond convention. Don't hesitate to ask us! We'll see you around the Convention.

Our very best,

Fran Cafferata Coe
2018 OSAF Chair

Tamara Cushing
2018 National Convention Chair

— Thank You Green Diamond —

GREEN DIAMOND Resource Company

A big thanks to Green Diamond Resource Company for making a financial contribution to print 2,000 extra copies of this issue for distribution to convention participants. Your generosity and support of SAF is appreciated.

Silviculture in the Pacific Northwest

BY MIKE CLOUGHESY

The Pacific Northwest is a land of varied forests, ownerships, and management objectives, and thus a varied silviculture. Silviculture is the art and science of managing forest stands and landscapes to meet the objectives of the forest owners.

In this travelogue of silviculture in the Pacific Northwest, I will review the major forest types, landowner types, variety of objectives, and associated common silvicultural systems in our region. I will consider Alaska, Washington, Oregon and Idaho to be the Pacific Northwest for this travelogue, as our *Western Forester* readership is composed of members in these state societies.

Forest types in the PNW

Major forest types in the Pacific Northwest include Douglas-fir; western hemlock-Sitka spruce; mixed conifer of eastern Oregon, Washington, and Idaho; mixed conifer of southwestern Oregon; ponderosa pine; and interior Alaska white spruce-hardwoods.

Douglas-fir. One of the region's most important types, is generally restricted to areas west of the Cascades in Oregon and Washington. Douglas-fir can be found in almost pure stands in much of its range. Associated species include western hemlock, western redcedar, true firs, mountain hemlock, ponderosa pine, and incense cedar. Douglas-fir is intermediate in shade tolerance and generally demands more light than its associates. Douglas-fir is a periodic seeder and requires bare mineral soil for germination. Large stand replacement fires and other disturbances are important to maintain Douglas-fir in this association. Douglas-fir is highly valued as a timber resource.

Western hemlock-Sitka spruce. Forests are found along a strip on the Pacific Coast from northern California to the Alaskan panhandle. The strip is narrow in the south and widens out as it goes north. Associated species include Douglas-fir, red alder, western redcedar, Pacific silver fir,

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lodgepole pine, and Alaska yellow cedar. Western hemlock is very shade tolerant and Sitka spruce is intermediate in tolerance. Timber volumes along the coast are very high. Western hemlock and Sitka spruce are reliable seed producers and seeds can germinate and seedlings grow on almost any seedbed.

Mixed conifer of eastern Oregon, Washington, and Idaho. The eastside mixed conifer type includes sub-types ranging from the cool-moist mixed conifer type at higher elevations to the warm-dry mixed conifer type at lower elevations. The principal species include ponderosa pine, lodgepole pine, Douglas-fir, grand fir, and western larch. The cool-moist type favors western larch and lodgepole pine, possibly with Douglas-fir and grand fir. The warm-dry type favors ponderosa pine, Douglas-fir, and grand fir. Idaho mixed conifer includes western white pine and western redcedar along with western larch, ponderosa pine, and Douglas-fir. Periodic wildfire is an important factor in this type.

Mixed conifer of southwestern Oregon. This complex type is a transition between the Douglas-fir forests of northwestern Oregon and the pine forests of eastern Oregon and northern California. Douglas-fir is the most common tree in much of this type, but almost always in mixed stands that include these conifers: western hemlock, Sitka spruce, Port-Orford-cedar, ponderosa pine, sugar pine, Jeffrey pine, knobcone pine, grand fir, and incense cedar. Hardwoods include California black oak, Oregon white oak, tanoak, Pacific madrone, and golden chinquapin. Evergreen shrubs such as ceanothus and manzanita are important in this type. Shade tolerances vary from the shade intolerant and drought resistant ponderosa pine to the mid tolerant and less drought resistant Douglas-fir and sugar pine to the more tolerant incense cedar and grand fir.

Ponderosa pine is a widespread type in eastern Oregon and Washington and much of Idaho. In the true ponderosa pine type, there is not enough moisture or too much periodic fire for more shade tolerant but less fire-resistant species to get established. Common associates include western larch and Douglas-fir on the moister end of the type and western juniper on the drier end. Ponderosa pine can be found in pure evenaged stands or grouped multi-aged stands depending on site, seed production, and disturbance history.

Interior Alaska white spruce-hardwoods. This type is the western extension of the boreal forest zone that spans Canada. Species associated with this type include white spruce, black spruce, paper birch, quaking aspen, balsam poplar, black cottonwood, and various willow species. Good to excellent seed crops are common and seed is generally dispersed by wind. Mineral soil is best for germination of these species. Natural regeneration by seeding of conifers and hardwoods and sprouting of hardwoods is common after harvest or fire. Stand replacement fire is a major factor in the boreal forests of interior Alaska.

Landowner types

The federal government is the dominant land manager in the Pacific Northwest, controlling 54% in the region. The breakdown of ownership between federal, state, local government, and private varies greatly from

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Next Issue: Wood Technology and Utilization

Forestland area in the Pacific Northwest by ownership and state				
State	**Federal**	**State & Local**	**Private**	**Total**
Alaska	64,295 (50%)	28,212 (22%)	36,070 (28%)	128,577
Idaho	17,054 (80%)	1,214 (6%)	2,980 (14%)	21,247
Oregon	17,886 (60%)	1,182 (4%)	10,720 (36%)	29,787
Washington	9,985 (45%)	2,903 (13%)	9,546 (42%)	22,435
Total	**109,220 (54%)**	**33,511 (17%)**	**59,316 (29%)**	**202,046**
SOURCE: FOREST RESOURCES OF THE UNITED STATES, 2012. USFS GTRWO-91. OCTOBER 2014				

state to state. Federal management ranges from 45% in Washington to 80% in Idaho. State and local government ownership ranges from only 4% in Oregon to 22% in Alaska. Private forests including tribal lands range from 14% in Idaho to 42% in Washington.

Management scenarios

Ownership is important to silviculture because it is a major driver of management objectives. Three basic management scenarios summarize the range of management objectives being practiced in the Pacific Northwest:

- **Reserve:** Managed to encourage late seral habitat and wilderness with limited timber harvest objectives;
- **Multi-resource:** Managed for a mix of environmental, social, and commercial timber harvest objectives; and
- **Wood Production:** Managed for wood production while protecting amenities as required by the state forest practices rules.

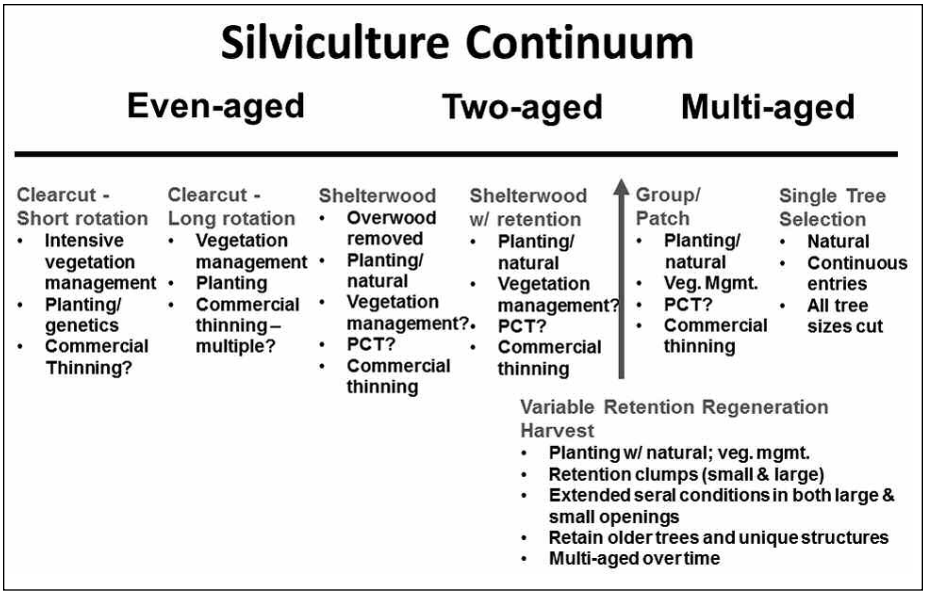
Common silviculture systems

Silviculture systems are designed to regenerate a new stand and they use varying degrees of disturbance to create the new stand. The Silviculture Continuum shows the range of silviculture systems on a range of disturbance from clearcut through variable-retention regeneration harvest to single tree selection. These systems create stands that vary from evenaged to two-aged to multi-aged.

Forest type, ownership and silvicultural systems

Douglas-fir-large private. The Douglas-fir type is plentiful in western Oregon and Washington and much of the most productive acres are owned by large private companies. Management objectives are primarily for wood production while working within the state forest practices rules to protect soil productivity, fish and wildlife habitat, water quality, and scenic qualities. Silviculture on these large private holdings involves primarily clearcutting followed by planting. Rotations range from 40-80 years depending on management plans. Commercial thinning is common where ground-based logging is practical.

Douglas-fir-federal-Bureau of Land Management. The Bureau of Land Management manages about 3.6 million acres of forestland in Oregon, much of it is in the Douglas-fir forest type and is interspersed with large private land in a checkerboard. Management objectives of BLM land in western Oregon are a mixture of multiple resource and reserve management. On multi-resource lands a common silviculture system is variable-retention regeneration harvest. This two- to multi-aged system includes areas where patches of trees are retained and areas where scattered trees are retained, much like a seed tree or even a shelterwood with retention depending on the prescription. The openings create habitat for early seral species such as migratory song birds, while the retained patches and individual trees provide habitat for later seral species.



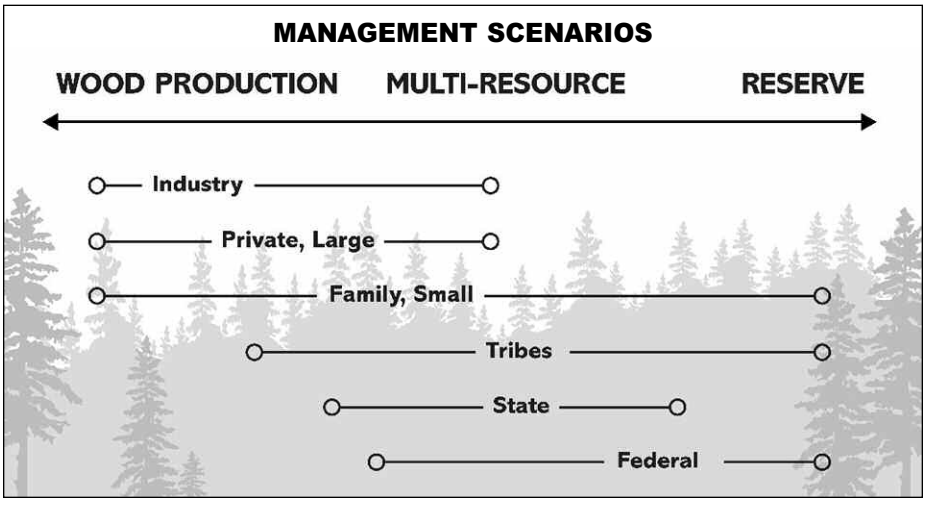


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PHOTO COURTESY OF JORDAN BENNER

Skyline logging on a western Oregon clearcut on a large private ownership.

Western hemlock-Sitka spruce-state lands. Spruce-hemlock forests along the Pacific Coast are found on the most productive forest sites in the Pacific Northwest. Abundant rainfall, deep soils, and moderate temperatures combine for high timber volumes and incredible tree heights. Coastal winds leading to blowdown are a major consideration in choosing silvicultural systems. The states of Oregon and Washington own a significant amount of this type as do large private in Oregon and Washington and the federal government in Alaska. Clearcutting is the most common silvicultural system on state lands in the spruce-hemlock forest type due to windthrow in partial cuts. State management plans call for significantly wider riparian management areas and a significantly higher number of wildlife trees than on private land. Sites are commonly planted with a mixture of Douglas-fir, western hemlock, and western redcedar. Natural seeding in plantations with hemlock and spruce is common.

Mixed conifer of southwestern Oregon-small private. Family forest landowners are important in southwestern Oregon. These lands are generally in the wildland urban interface and preparing for wildfire is a major factor in their management. The most common silviculture system for small private owners in this type is generally called restoration thinning and is a version of single tree or group selection that is designed to reduce ladder fuels and space crowns by thinning and reduced surface fuels by mowing and prescribed burning. Clearcutting is not generally used because successful regeneration of these low elevation marginal lands can be difficult and expensive and timber productivity is low.

Dry mixed conifer-federal-U.S. Forest Service. National forests are the major ownership type in eastern Oregon and eastern Washington and dry mixed conifer is a major type on these forests. Principal species include ponderosa pine, Douglas-fir, and grand fir. Frequent, low intensity fire historically maintained these forests as widely spaced ponderosa pine of varying sizes with groups. Since the 1950s, fire suppression has allowed Douglas-fir and grand fir to move into these forests and greatly increase forest density. This continuous fuel bed of various heights has led to a change in fire regime with forests that featured low intensity surface fires becoming forests that feature high intensity stand replacement events. The primary silvicultural system to help create fire resilient forests is locally called restoration thinning, but is actually a version of single tree and group selection. One caveat is that an administrative rule known as "Eastside Screens" limits harvest of trees over 21" dbh on national forests in the region and has made true single tree selection not possible and achieving fire resiliency challenging.

Moist mixed conifer (Idaho)-all owners. Moist mixed conifer types dominate in northern Idaho. These forests have the widest range of commercially harvested tree species (10 species) in the Rocky Mountains. Generally, the primary management focus is to favor species which are early seral for a given site, often favoring larch and blister rust-resistant western white pine while also managing for the other species that commonly seed in with them such as lodgepole pine and western redcedar. The exact species mix varies with the site and ownership objectives. Clearcutting is a commonly used silvicultural system to propagate these early seral species. On larger ownerships, focus is shifting to growing trees on shorter rotations (as little as 40-50 years), since the region's mills are increasingly optimized for smaller logs.

Ponderosa pine (Idaho)-all owners. Ponderosa pine type is a common type throughout Idaho, particularly at lower elevations and in the southern part of the state. Historically, fires tended to keep these sites dominated by ponderosa pine, but fire exclusion and partial harvesting have produced more Douglas-fir and grand fir than these sites had historically. Most landowners are trying to get these sites back to ponderosa pine through varied silvicultural approaches. Restoration thinning or selection management is common. On federal lands, there is growing discussion of managing these forests in ways that allow surface fires to burn through forest understories, when and where homes and other values can be protected.

Alaska interior spruce-state forest and native corporations. Spruce type covers about two-thirds of the interior Alaska boreal forest. White spruce is the predominant commercial species and covers large areas on warm, permafrost-free soils. Most productive white spruce stands that are relatively easy to access are on state lands. As a result, most harvesting occurs on these state lands. Native Corporations also manage white spruce stands for timber. Although about half the area of white spruce stands are owned by federal agencies, most of these are in remote areas without road access or in parks, wildlife refuges, and wilderness areas and are not actively managed other than for wildfire suppression. Black spruce type covers a vast area of

the interior Alaska boreal forest. However, black spruce forests grow on cold, permafrost-dominated soils that are not productive. Therefore, black spruce is typically not harvested. Clearcutting and selection cutting for white spruce are the most common harvesting methods. But in some clearcuts, you might see some residuals that loggers did not want. Natural regeneration is commonly relied on. However, planting of spruce is applied on about one third of harvested stands.

Alaska interior hardwood-state forests. Hardwood type covers about a quarter of the area of the Alaska boreal forest. Two major species are birch and aspen, but they are not as productive as white spruce and large trees often have defects making them less desirable for timber. Hardwood trees are often only harvested for fuelwood at a small scale. However, demand for woody biomass is increasing for energy generation, resulting in increased harvesting of hardwood species, especially birch. The state is the largest ownership of hardwood forest type overall and owns most accessible stands. As a result, most harvesting of hardwood species occurs on state forestland.

Conclusion

I hope that through this travelogue you have seen how Pacific Northwest silviculture incorporates forest type, landowner type, and the landowner's objective to artfully and scientifically manage forest stands and landscapes to meet the objectives of the forest owners. The additional articles in this issue will further illustrate this point.

Thanks for traveling with me on this Pacific Northwest silviculture adventure. A great way to get deeper into this subject is through a web learning series which Oregon Forest Resources Institute (OFRI) helped develop: *Silviculture Alternatives for the Pacific Northwest*. This four-part series covers much of the information in this article, and a whole lot more is available for view at: https://TheDevonshireGroup.org. Originally broadcast in 2017, sessions include: 1) assessing units and projects; 2) pre-operations planning; 3) operations; and 4) financial trade-offs and good neighbor outreach. ◆

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