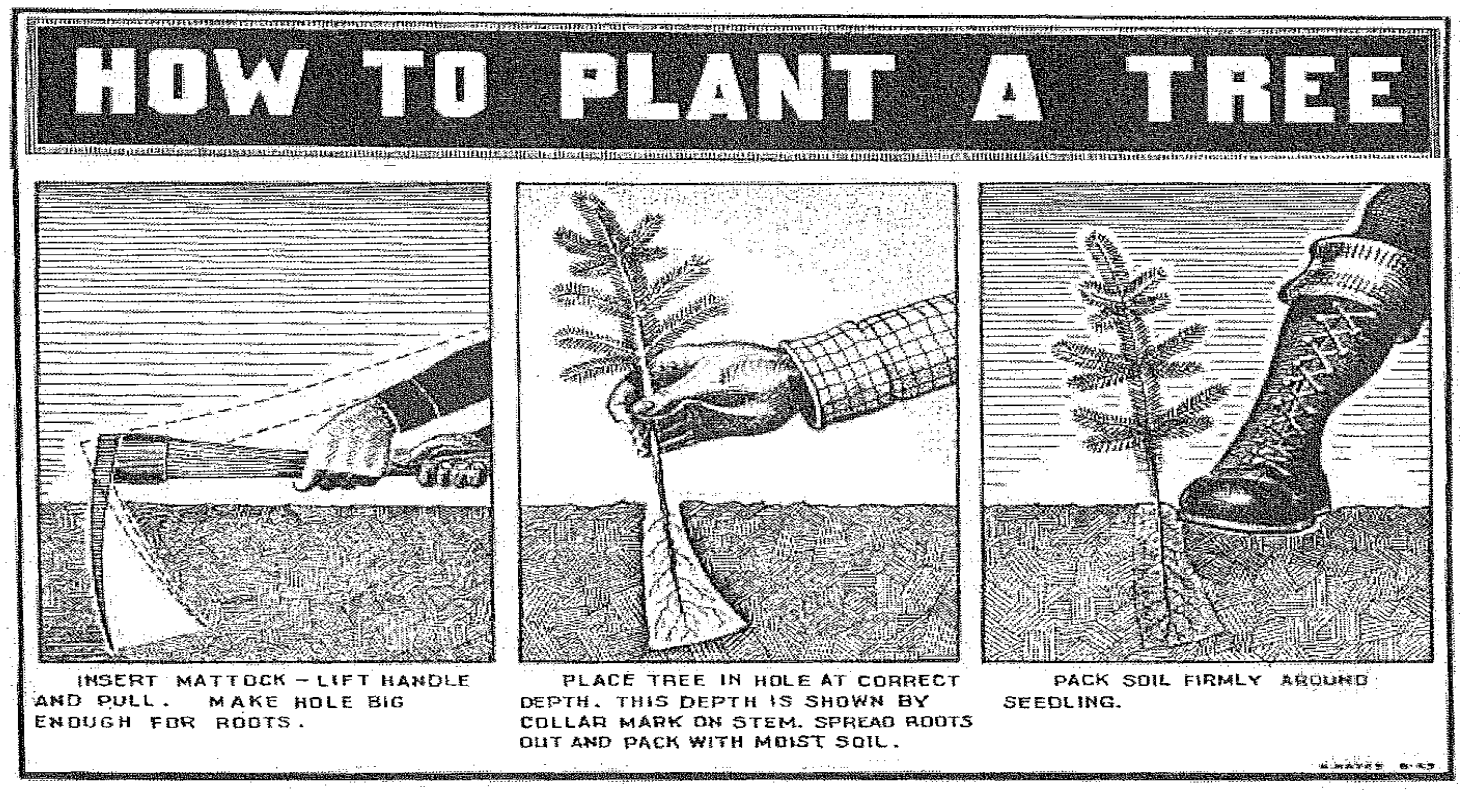
Forest Resources Division

Sources of Native Forest Nursery Seedlings

February 2025



Cover illustration by Hugh Hayes August 1, 1914 - June 25, 2013
Following World War II Mr. Hayes worked for the Oregon State Department of Forestry in Salem, from 1945 until his retirement in 1993, drawing fire protection maps and safety cartoons, designing plans for guard stations and bridges, and illustrating field guides of Oregon trees.

Contents

Helping to meet the changing needs of family and non-industrial private forestland owners.

Published by the Oregon Department of Forestry, Forest Resources Division with assistance from the USDA Forest Service, PNW Region, State & Private Cooperative Forestry.

Introduction

This publication is a service provided by the Oregon Department of Forestry to help meet the changing needs of family and non-industrial private forestland (NIPF) owners actively engaged in:

- Afforestation
- Reforestation
- Forest Management
- Tax Incentives
- Timber Production
- Riparian Management
- Forest Pest Management
- Watershed Enhancement
- Fish and Wildlife Habitat Improvement
- Marketing of Forestry Carbon Offsets, etc.

Published annually, this catalog helps landowners locate suitable tree stock to meet their unique and individual resource objectives.

This is just one of several valuable services that ODF provides to family and private non-industrial forestland owners. Other services include providing information and advice, technical assistance, and financial incentive guidance on: Forest Health Issues, Silvicultural Practices, and Land Stewardship Activities.

Reforestation is required under Oregon law if you harvest below stocking levels required by the Oregon Forest Practices Act. To learn more about stocking requirements or seed zone information, contact your local ODF Stewardship Forester (https://www.oregon.gov/ODF/Working/Pages/FindAForester.aspx).

In the last several years, seedling supplies have been very tight. We expect continued high demand and limited seedling supplies for those landowners who do not plan ahead. We encourage forest landowners to begin plans to secure seedlings at least 2 years before harvest is completed. This should help assure seedlings are available when needed.

Please contact individual nurseries (see pages 20-21 for stock information, current seedling inventories and ordering procedures. You can learn more about each nursery by visiting their website or contacting them directly.

Nurseries growing seedlings for Family Forest Landowners can obtain seed from the Oregon Seed Bank. The Seed Bank supports Family Forest Landowners across the state of Oregon by providing them access to superior tree seed for their reforestation needs. Seed availability is updated annually to assure that the best seed sources and most current, genetically improved seed is available. Additional information is available at: https://www.oregon.gov/odf/Working/Pages/Seed.aspx.

Definition of Terms

Species
The common types of native forest tree species in Oregon.

Seed Zone
The area where seed was collected and can be safely outplanted. The risk of planting a seedling outside its seed zones varies depending on the species, site, climate, etc. Seed zone numbers correspond to the numbers shown on the maps on pages 22-25. Maps are provided for both seed zone classification systems commonly used in Oregon. Genetic research shows that the wider seed movement generally allowed by the 1996 seed zones poses little risk during reforestation.

Elevation Band
The elevation where seed was collected and can be safely outplanted. Some nurseries present this as a range. Others present a single elevation value, which represents the top of the elevation range where seed was collected in 500-foot increments. For example, if the elevation is noted as 1,500', the seed came from 1,000-1,500 feet in the seed zone listed. It is important to follow elevational guidelines when selecting seed or seedlings.

Woods-Run Seed and Seedlings
Wild or woods-run seed is collected from natural forest stands in a given seed zone and elevation. While woods-run seed can produce some trees with excellent genetic characteristics, on average, trees grown from these sources will be inferior to improved seedlings derived from decades of tree improvement.

Genetically-Improved Seedlings
Formal tree improvement programs for Douglas-fir have existed for over 60 years in the Pacific Northwest. These testing programs have used traditional breeding techniques to identify appropriate seed sources and families that are widely adapted, fast-growing, have desirable growth forms, and can have improved disease or insect resistance. During the course of this testing, thousands of different families have been tested and the best families have been placed into seed orchards for seed production.

The cost of genetically-improved seedlings is often slightly higher than that of seedlings grown from wild or woods-run seed. However, the improved growth of the genetically-improved seedlings will more than offset these costs.

Heavy Cone Crop on Douglas-fir at ODF's Schroeder Seed Orchard in St. Paul, OR.

Definition of Terms

Stock Type
There are two basic types of planting stock: bareroot and container-grown seedlings. Bareroot seedlings are sown and grown in nursery beds, lifted, and then sold without soil on the roots. Container grown or "plug" seedlings are normally grown in a greenhouse. The container's cavities are filled with growing medium and the seed is sown on top. Nurseries extract plug seedlings from containers before shipment.

There are many sizes and shapes of containers. Some nurseries also offer Plug+1 seedlings, which are grown in a greenhouse for 9-12 months, then transplanted into a bareroot nursery for one year.

For a discussion on the pros and cons of various stock types, seedling sizes, and containers, see the "**Guide to Reforestation in Oregon 2006**" by Robin Rose and Diane Haase (https://www.oregon.gov/ODF/Documents/WorkingForests/ReforestationGuide.pdf).

Age/Container
Bareroot seedlings are typically classified by the number of years grown in the nursery or transplant bed. The first digit in "1+0," "2+0," "1+1," etc., represents the number of seasons a seedling was grown in the nursery seedbed. "1+1" seedlings are two-year-old seedlings grown in a nursery bed for one season, then transplanted and grown in the nursery bed for a second season. The second digit is the number of seasons the seedling was grown in a transplant bed. "P+1" indicates a seedling was grown for one season in a container, plus one season in a transplant bed.

Container seedlings are also called "plug" seedlings. They are typically grown in a greenhouse in a variety of container sizes and extracted after one year. A styro-8 is a common container seedling size grown in a styroblock container of 80 cells with a cavity size of 8 cubic inches.

Disease Resistant
Disease resistant western white pine, sugar pine, and Port Orford cedar seed is available. In addition, new genetic selections of Douglas-fir selected for swiss needle cast resistance have been made and grafted into orchards. Seed from these trees is now available at the Oregon Seed Bank. More information on disease resistant pine and Port Orford cedar is available on the web page of the USDA Forest Service Dorena Genetic Resource Center (https://www.fs.usda.gov/detail/r6/landmanagement/resourcemanagement/?cid=stelprdb5279775).

Price
The cost per seedling vary by species, growing method, and the genetic value of the seed used to produce the seedlings. Seedlings are commonly sold as groups, not as individual seedlings. For example, if prices are quoted as $.30 each, cost for 100 seedlings would be expressed as $30/100 or cost for 1,000 seedlings would be $300/M.

Producing Improved Seed

Steps in the Production of Improved Seed

Genetically improved seed is generally derived through long-standing tree improvement programs. Seed is produced in highly-managed seed orchards. These orchards are managed with the overall objective of producing heavy, consistent, predictable cone crops at young ages to rapidly make the best genetically improved seed available for reforestation.

Newly grafted Douglas-fir seedlings grown under greenhouse conditions. Trees are typically grafted in February or March and planted in the field in October.

Most seed is produced in clonal seed orchards consisting of desirable parent scion wood grafted on specially produced rootstocks. The type of production system is very analogous to fruit tree production systems where a given apple orchard may consist of different apple varieties such as golden delicious, red delicious, or honeycrisp apple varieties. Clonal seed orchards are much the same. Scionwood is grafted upon the selected rootstocks either under greenhouse conditions or directly in the field. If grafted in the greenhouse, grafted trees are generally grown for a period of 6 to 10 months before being planted in the field.

Once production of greenhouse grafted trees is completed, trees are shipped to the orchard site and planted once field conditions are suitable for establishment.

Grafted Douglas-fir trees eight months following grafting ready for planting.

Orchard sites are typically intensively managed to promote rapid establishment and growth and high survival. Preplant site preparation and chemical site preparation treatments are used to eliminate competing vegetation. Soil physical conditions are improved with subsoiling and disking to create conditions favoring root growth. Planting usually occurs in October once fall rains have recharged soil moisture. In the second growing season, herbicide treatments are applied to the tree rows to direct water and nutrient resources to the new orchard trees rather than to competing vegetation. Trees are staked and pruned to promote rapid upright growth. During drought conditions (typically June until September) in the first several growing seasons, trees are watered to reduce stress and promote growth. In the second and third growing season, nutrient amendments are added as needed to promote growth and accelerate flowering.

Producing Improved Seed

Given good growing conditions, trees are often large enough to enter into their reproductive phase by the 5th or 6th growing season. To assure early and consistent cone crops, young trees are stimulated to produce early cone crops through a combination of treatments including partial stem girdling and injection of gibberellic acid. These treatments alter plant hormone levels and carbohydrate levels and flowering typically occurs in the next spring.

Young Douglas-fir orchard being stimulated with gibberellic acid.

Following the initiation of flower stimulation treatments, orchards are typically stimulated at two -year intervals so cone crops are collected every two years. Once these orchards are mature, stimulation treatments often consist of partial girdling treatments alone without supplemental gibberellic acid injections.

To assure high seed yields, cone crop must be protected from damaging insect pests. To reduce seed damage, registered insecticides are applied in the spring.

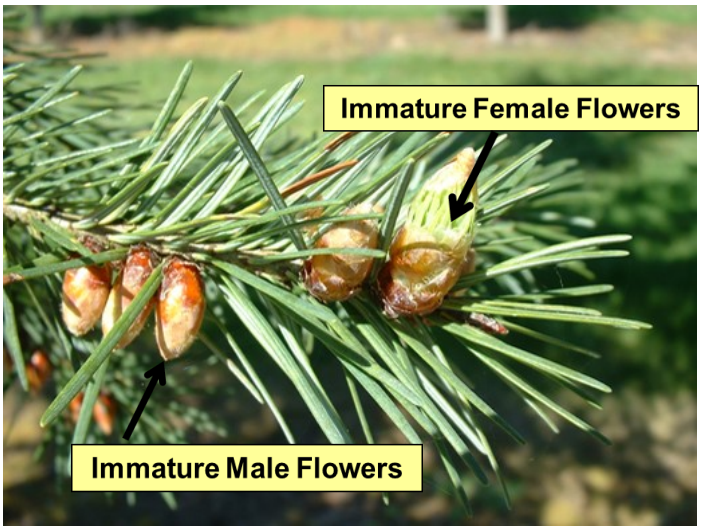
Mature Douglas-fir orchard tree showing partial stem girdles created with a chain-saw to stimulate flowering.

Douglas-fir cones typically ripen four to five months after flowering. For maximum seed yields, cones are harvested when seed are fully ripe, but before the cones begin to flare and disperse their seeds. After picking, cones are placed in well-ventilated drying sheds to reduce their moisture contents. After several weeks of drying, cones are shipped to processors and seed is extracted and returned. Proper storage conditions are important for long-term seed storage. Douglas-fir, ponderosa pine, and western hemlock seeds can be stored for decades without losing vitality.

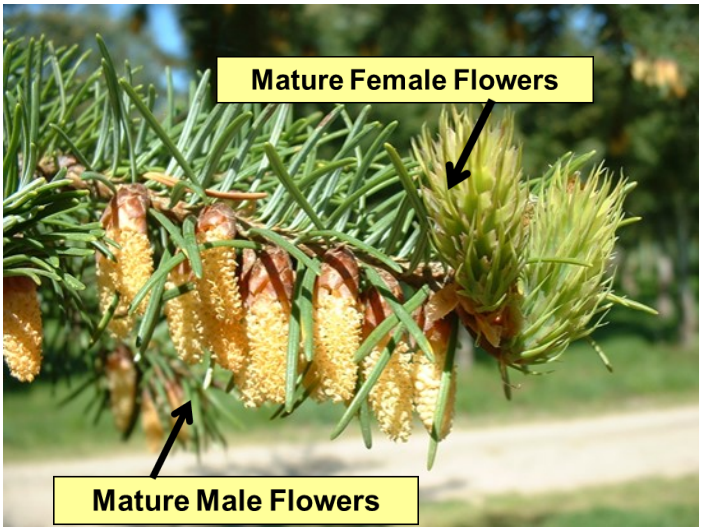
Cone drying facility filled with newly collected cones at the Schroeder Seed Orchard in St. Paul, OR.

Producing Improved Seed

Flowering and Cone Development Processes in Douglas Fir



Immature male and female flowers on Douglas-fir. At this stage, female flowers are not receptive and male flowers will not yet shed pollen.



Mature male and female flowers on Douglas-fir. At this stage, female flowers are fully receptive and pollination can take place. Male flowers are actively shedding pollen.

Mature Douglas-fir cones. At this stage of development, cones scales have opened and cones are actively shedding mature seeds.

Fertilized Douglas-fir cones. At this stage, pollination is complete and cones become pendant. Male flowers are no longer shedding any pollen.

Selection of Seed Sources

The Role of Tree Improvement to Assure Healthy, Productive Forests

When nurseries produce seedlings or landowners purchase these seedlings, one of the most important considerations is the genetics of the seed. The seed used to produce these seedlings can vary widely from wild seed collected from parents of unknown genetic composition to highly controlled pollinations between selected parents. To facilitate the deployment of genetically superior forest tree species, tree improvement programs in the Pacific Northwest were initiated in the late 1950's. Of the commercially important timber species, tree improvement of Douglas-fir was the first to begin and is generally the most advanced program. Other commercially important tree species with active and long-standing tree improvement programs include western hemlock, western red cedar, and ponderosa pine.

Benefits of Improved Seed

There are many potential benefits of using genetically improved seed. Production of this seed under controlled orchard conditions is generally far more predictable than relying upon wild seed collections. Under natural conditions, seed production can be highly variable and bumper seed crops often occur at erratic intervals interspersed with low seed production, and even years with complete crop failures. In addition, management of wild seed production areas and collection of seed from these stands can be challenging. These factors combined with uncertain growth, form and disease and insect susceptibility of these wild seed collections make reliance on these sources problematic. While wild seed collections once comprised almost all of seedlings planted in the Pacific Northwest, aggressive tree improvement efforts and the development of seed orchards to produce improved seed has dramatically changed the genetics of the trees being deployed. In the last 10 years, approximately 95% of the Douglas-fir seedlings produced in the Pacific Northwest for deployment west of the Cascades have been derived from some level of tree improvement with only 5% consisting of woods run seed collections.

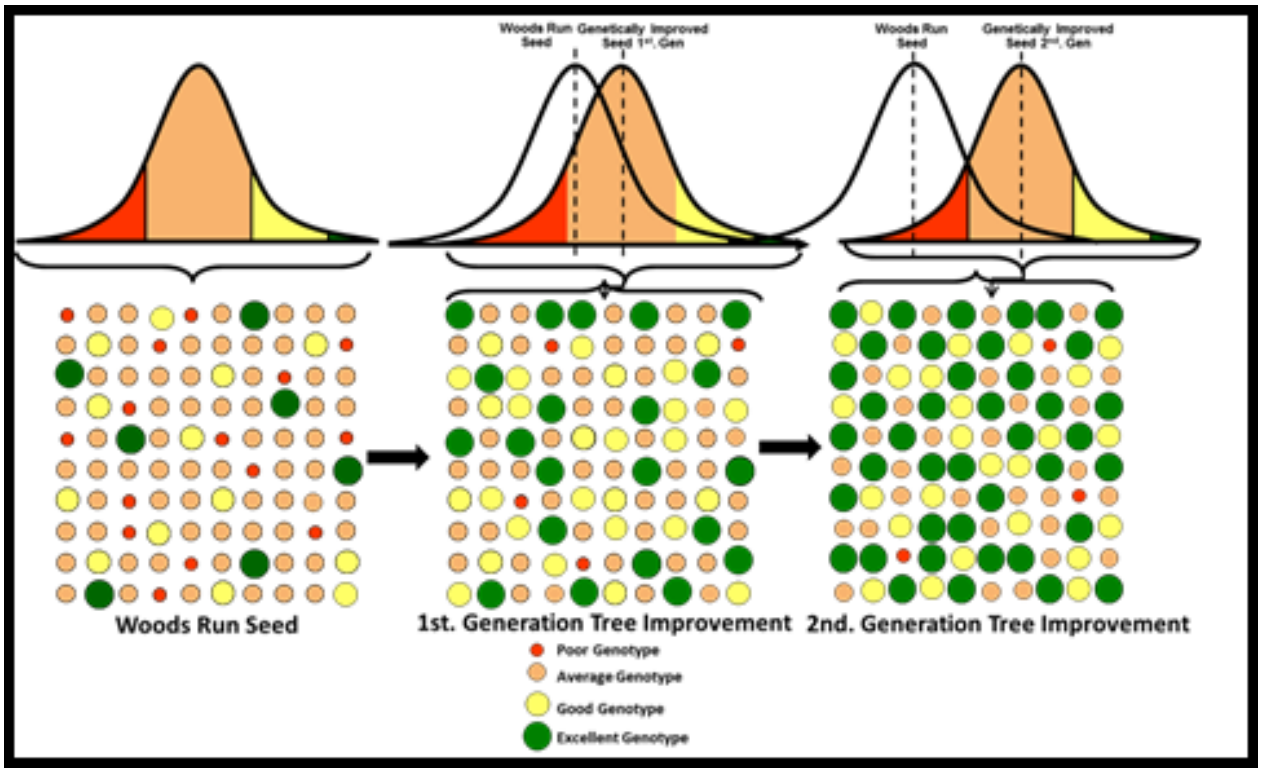
Specific advantages of improved seed include increased growth, improved insect and disease resistance, and for some seed sources, increased resistance to animal browse. Improved seed of Douglas-fir, western hemlock, and western red cedar selected for increased productivity is widely available for deployment in western Oregon. Disease resistance is also an important consideration for western white pine, sugar pine, and Port Orford cedar. For sugar and western white pine, pine blister rust is an important disease that can kill or damage these species. Breeding work with both species has led to the development and production of seeds that will produce seedlings with increased levels of resistance to the disease. Resistance to *Phytophthora lateralis*, a root rot disease, is an important trait in Port Orford cedar that the USDA Forest Service has developed in their selections. The Oregon Seed Bank is able to purchase seed from these selections and this seed is made available to Family Forest Landowners through the Seed Bank.

Selection of Seed Sources

How Much Gain Can Be Achieved Through Deployment of Improved Seed?

Each cycle of a tree improvement program would be expected to shift the curve forward for the traits of interest. The relative proportion of good and outstanding trees relative to poor trees would increase. This shifting of performance level would be expected to occur in each subsequent tree improvement cycle. This performance is illustrated in the figure below. In this case, each shift represents improvements from woods-run seed collections to first generation seed orchards to second generation seed orchards.

The level of improvement that occurs in each cycle of tree improvement is important to all forestland managers and owners. These gains can be quantified for characteristics such as height, diameter, or volume growth. Ye and Jayawickrama (2006) estimated that deployment of Douglas-fir derived from first generation seed orchards would result in volume gains of approximately 50% at age 15 compared to plantations established using woods-run seed. They further estimated that use of second generation seed would result in further volume gains of 25% compared to first generation seed and use of third generation seed could result in further volume gains of approximately 22% compared to second generation seed. Volume gains of this magnitude can illustrate why the overwhelming percentage of Douglas-fir seedlings planted in the Pacific Northwest are derived from improved seed.



Graphic representation of the gains possible through each round of tree improvement from woods-run seed to 1st generation selections to 2nd generation selections. Each round of tree improvement results in better stands being planted on the landscape.

Selection of Seed Sources

How Much Does Genetically Improved Seed Cost?

While genetically-improved seed is often more expensive on a pound-to-pound basis, in actuality, improved seed represents a relatively small component of the entire cost of reforestation. Woods-run Douglas-fir typically sells for $75 to $150 per pound when it can be obtained for a given deployment area. Genetically improved Douglas-fir seed can cost between $300 and $1,200 per pound depending upon level of tree improvement and seed scarcity. While this seems dramatically higher, there are approximately 40,000 Douglas-fir seeds per pound. Using these figures, unimproved Douglas-fir seed will cost 0.19¢ to 0.38¢ per seed ($1.90 to $3.80 per thousand seeds). In comparison, improved Douglas-fir seeds will cost 0.76¢ to 1.50¢ per seed ($7.60 to $15.00 per thousand seeds). Compared to total reforestation costs, the percentage cost increases attributable to use of improved seed is even lower. Given the large growth increases attributable to improved genetics, more rapid site occupancy and grown closure, and other potential positive attributes such as increased insect or disease resistance, use of genetically superior seed sources are one of the best options available when reforestation decisions are being made.

Young, vigorous Douglas-fir seed orchard in the middle of the 3rd growing season following planting at the Schroeder Seed Orchard complex in St. Paul, OR.

Genetically improved Douglas-fir seedlings on right side of photo vs. woods-run seedlings on the left side of photo.

Ten-year old Roseburg Low Elevation Orchard at Schroeder Seed Orchard Complex with heavy cone crop. This young 3-acre orchard produced over 800 bushels in its' second harvest and illustrates heavy seed production possible in young, well-managed seed orchards.

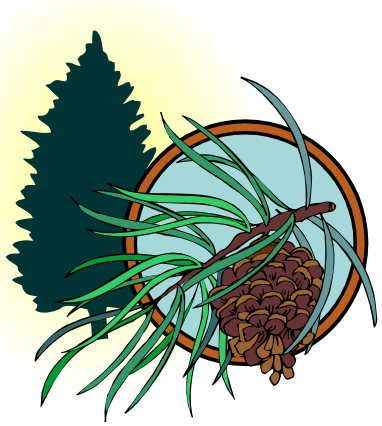
Future Direction in Tree Improvement

To facilitate the deployment of genetically superior forest tree species, tree improvement programs in the Pacific Northwest were initiated in the late 1950's. Tree improvement of Douglas-fir was the first to begin and is generally the most advanced program. Western hemlock is at a similar stage of development. In the last few years, approximately 95% of the trees planted in the Pacific Northwest have been derived from orchard seed produced in conjunction with an established tree improvement programs. Seed of many of our major timber species is being produced in a combination of 1st and 2nd generation orchards. Currently, 1st generation seed orchards are producing the bulk of the seed utilized, but younger 2nd generation orchards are beginning to produce seed and their production capacities will increase each year. Deployment of seedlings produced with 2nd generation seed will become increasingly more important.

While seed production from the 2nd generation orchards is increasing, efforts are underway to further improve tree characteristics with 3rd generation breeding programs. These 3rd generation breeding programs are well-advanced for Douglas-fir and western hemlock and the first 3rd generation progeny tests have been established for these species. These are significant breeding efforts and while the first 3rd generation progeny tests have been established, breeding efforts continue to complete the 3rd cycle breeding programs. For western Oregon, major 3rd cycle Douglas Fir tree improvement programs include the North Coast, South Central Coast, CASTIC (Cascade Tree Improvement Cooperative), ROSETIC (Roseburg Tree Improvement Cooperative, and MEDTIC (Medford Tree Improvement Cooperative) Tree Improvement Cooperatives. Together, these cooperatives cover much of western Oregon.

The most advanced of these tree breeding cooperatives is the South Central Coast Douglas Fir Breedign Cooperative. Breeding work has been completed and the resulting progeny tests have completed their 8th growing season. Based on measurements in these test, the best selections were made based on growth rates, stem form, and adaptability. The first orchards were grafted at the Schroeder Seed Orchard Complex in 2024 and the resulting trees were planted in a new 3rd. Generation Seed Orchard in October 2024. We would expect this new orchard to begin producing its first cone crop in 2030.

Although the specific details of each of these cooperative breeding cooperatives do differ, we can illustrate some of the broad details for breeding for the North Coast Douglas-fir Breeding Cooperative. This is a large and comprehensive breeding effort. All this work is conducted using traditional tree breeding techniques. No genomic modification techniques are being utilized. Some of the traits that are being improved are adaptability, increased growth rates, increased insect and disease resistance, and increased wood quality. The total breeding program calls for approximately 800 successful crosses to be made. This comprehensive breeding effort includes at least 12 separate entities including private industrial, state, federal, and university agencies. The land base currently covered in this breeding effort encompasses approximately 950,000 acres.



Future Direction in Tree Improvement

In the North Coast Breeding Cooperative, breeding efforts are based on 500 1st and 2nd generation parents being bred in a subline-based breeding program consisting of 26 separate sublines. As of the end of 2021, over 750 crosses have been completed. An additional 225 crosses were made in the spring of 2019. Third cycle breeding efforts were completed for the North Coast Breeding Cooperative in 2023. The first progeny tests were established in January 2019. These tests are expected to be measured at ages 7 and 11 and following the measurements and analysis, the best trees from the best crosses will be identified. Scion from these selected trees will be collected and grafted on suitable rootstock and form the basis for the 3rd generation Douglas-fir seed orchards throughout western Oregon.

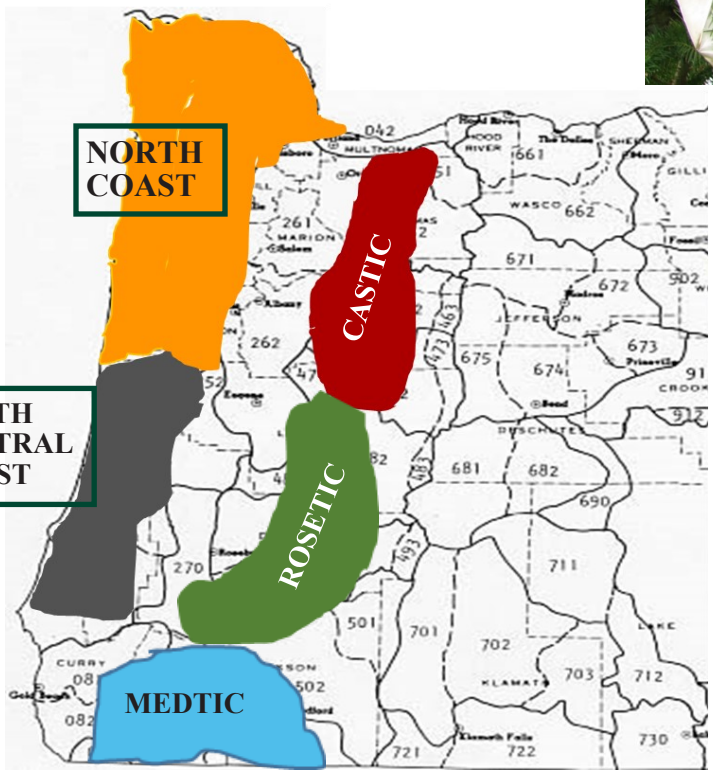
Young 6-year-old seed orchard that is well-established and capable of producing its first crop at the Schroeder Seed Orchard Complex (Photo above)

Under seed orchard conditions, orchards can produce high cone yields with excellent seed fill at 2-year production intervals. Under optimal conditions, seed orchards are capable of producing up to 400 bushels of cones per acre or 200 lbs of Douglas Fir seeds per acre. Cost of production can be predictable and extremely low (Photo to the right)

Future Direction in Tree Improvement

Young 3rd cycle Douglas-fir breeding orchard. Trees with white breeding bags on the branches are trees on which breeding will take place. The breeding bags contain branches that have female flowers present. Male flowers have been removed from the branches. When the female flowers are fully receptive, pollen from known male parents will be injected into these bags to produce controlled crosses with known female and male parentage.

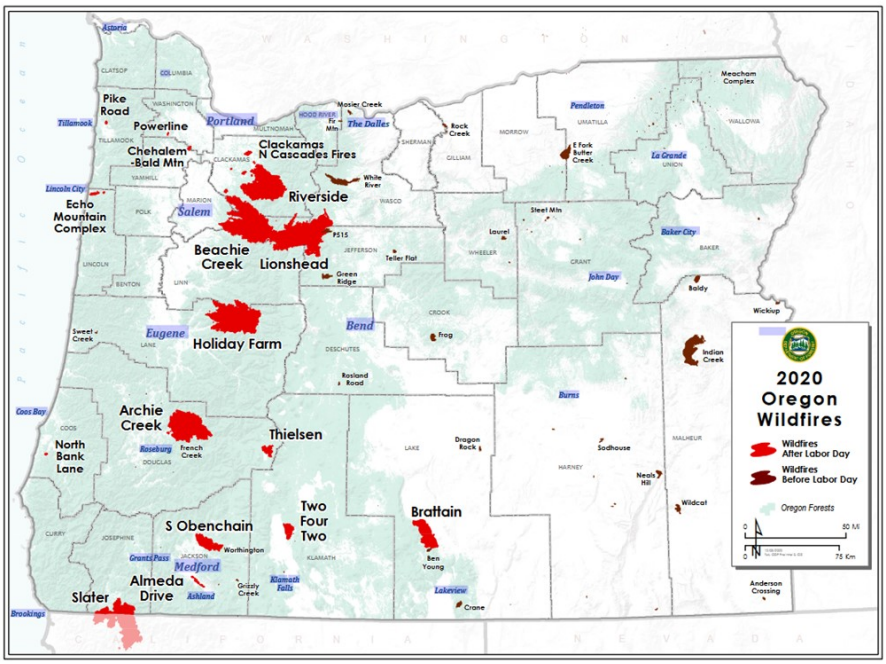
Breeding bag with controlled crosses maturing. When cones are fully mature, the cones will be collected to produce seed to grow the next series of progeny tests for the cooperative members.



Map showing the approximate coverage areas for the North Coast, South Coast, CASTIC, ROSETIC, and MEDTIC tree breeding cooperatives in western Oregon.

Responses to 2020 Wildfires

The 2020 calendar year saw unprecedented fire impacts throughout the state or Oregon. In western Oregon, the most significant fires were the Riverside Fire (138,054 acres), the Lionshead Fire (204,469 acres), the Beachie Creek Fire (193,573 acres), the Holiday Farms Fire (173,393 acres), the Archie Creek Fire (131,542 acres), the South Obenchain Fire (32,671 acres), and the Slater Fire (157,220 acres). Together, these major fires burned more than one million acres in western Oregon and northern California. The impacts on communities within these fire zones was dramatic, but direct impacts to forest lands within these fires areas was also significant. On many acres, forest stands were completely consumed by the fires. Other forest stands within the overall fire acreages were impacted to varying degrees. In many cases, stands that were damaged, but not totally consumed by the fires, are scheduled for salvage logging to secure some timber value before wood degradation occurs. Young stands killed by the fires are not candidates for salvage logging and these stands may need to be site-prepped and replanted to assure new, rapidly-growing stands are successfully established.



Map of Oregon showing major 2020 fires and the area impacted by each respective fire.

The unprecedented scale and damage caused by these fires has dramatically increased the need for reforestation of these impacted lands. When these impacted lands are being reforested, it is important that the correct species are being planted, but it is equally as important that the correct genetic sources of the correct species are being sourced and replanted in the appropriate areas. Selecting seed of the appropriate seed zone and elevation for each fire zone is critically important. New stands established following these fires must be adapted to the specific growing conditions of each fire zone. Planting seedlings of the appropriate seed sources will assure that these new stands are long- term assets on the landscape, not liabilities if poorly adapted genotypes are planted. If available, seedlings produced from genetically improved seed will grow faster and lead to the establishment of more productive forests compared to seedlings grown from wild seed collections. This can decrease recovery times and increase the long-term economic values derived from these new forests.

Responses to 2020 Wildfires

For each of the major fires of 2020. The general seed zones impacted are:

Riverside: Old seed zone 452. New seed zones 9 and 12.

Lionshead: Old seed zones 461, 462, and 463. New seed zones 9, 12, and 13.

Beachie Creek: Old seed zones 461 and 462. New seed zones 9 and 12.

Holiday Farm: Old seed zones 471 and 472. New seed zones 9, 12, and 14.

Archie Creek: Old seed zone 491. New seed zone 10.

South Obenchain: Old seed zone 502. New seed zone 16.

Slater: Old seed zones 511 and 512. New seed zone 3.

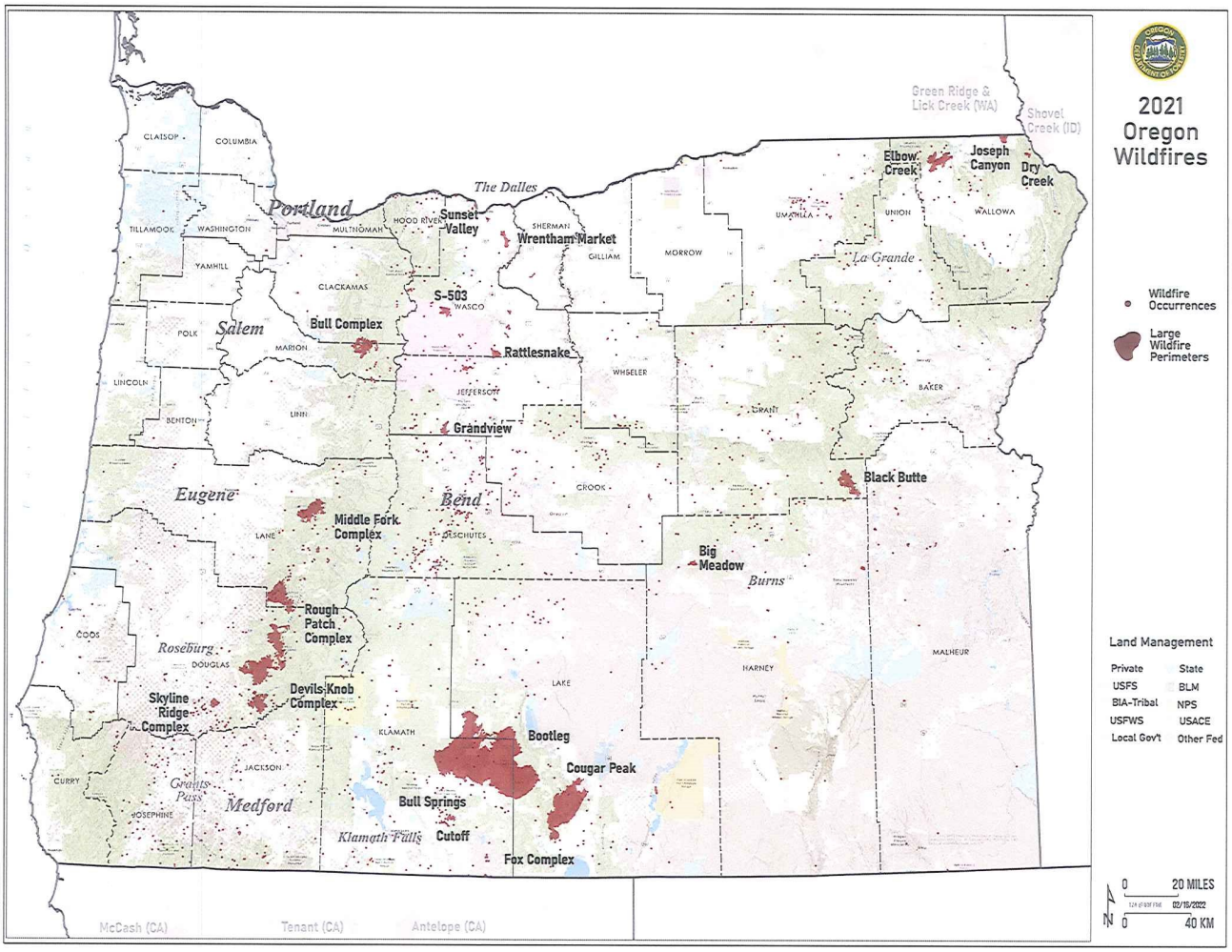
A view of an impacted area within the overall footprint of the Beachie Creek Fire. Not all areas within the fire footprint burned uniformly. Some areas burned completely, while adjacent stands of trees were undamaged.

Mature stand of trees within the Beachie Creek Fire completely killed by the fire.

The Oregon Seed Bank fortunately did have seed available to reforest many of these areas and seed distribution began while the fires were still burning. Other public agencies and private companies may also have seed that they can make available to support these reforestation efforts. A significant challenge in reforesting these vast areas will be securing sufficient seedlings to replant acres with significant mortality. In normal years, seedling availability can be tight and demand for seedlings can exceed seedling availability. This problem can be accentuated for Family Forest Landowners especially if they fail to plan ahead to reforest their lands following logging. The extent of these fires will exacerbate these preexisting seedling availability issues. Full recovery from these fires will be a multi-year process before all these acres can be successfully reforested. The Oregon Department of Forestry is working with federal, state, and other private constituencies to begin formulating response to these fires. For Family Forest Landowners impacted by these fires, Oregon Department of Forestry Stewardship Foresters can be a critical resource to begin recovery efforts.

Responses to 2021 Wildfires

After the catastrophic 2020 fire season there was hope that 2021 would prove to be a much quieter fire season. Unfortunately, this was not the case. The 2021 fire season again proved to be one of the most active fire seasons on record. In 2021, a total of 828,778 acres burned in Oregon. In western Oregon, the most significant fires were the Bull Complex Fire (24,894 acres), the Middle Fork Complex (30,929 acres), the Rouge Patch Complex (50,409 acres), the Devils Knob Complex (70,110 acres), the Skyline Ridge Complex (5,760 acres). Central Oregon suffered through its own major fires and these included the Bull Springs Cutoff Fire (24,894 acres), the Bootleg Fire (113,717 acres), the Cougar Peak Fire (91,810 acres), and the Fox Complex (9,754 acres). These additional fires in 2021 added to the affected acres in 2020 further increasing the need to reforest forest lands affected by these fires.



Map of Oregon showing major 2021 fires and the area impacted by each respective fire.

Responses to 2021 Wildfires

New stands established following these fires must be adapted to the specific growing conditions of each fire zone. For each of the major fires of 2021. The general seed zones impacted are:

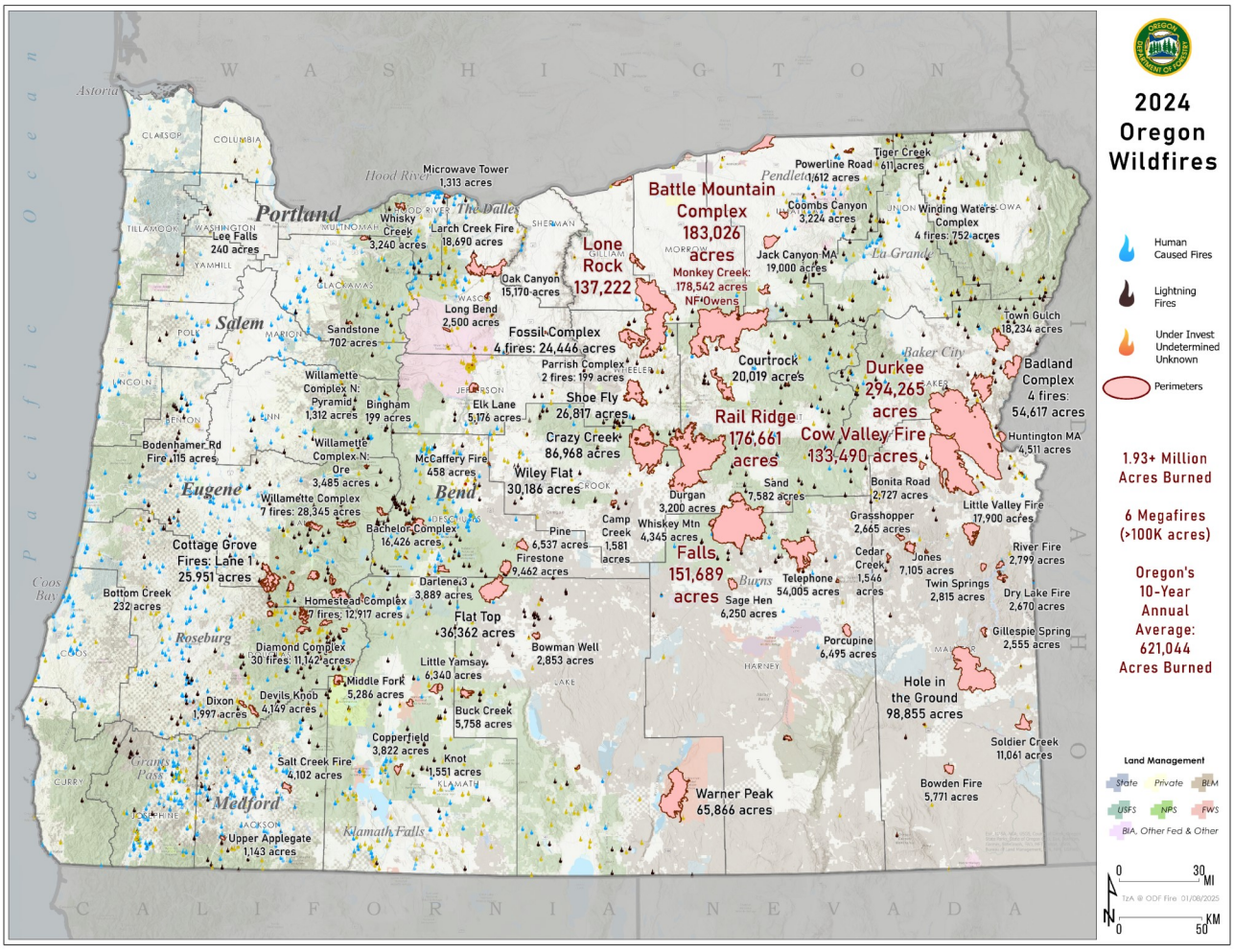
Bull Complex: Old seed zones 452 and 462. New seed zone 12.
Middle Fork Complex: Old seed zones 472 and 482. New seed zone 143.
Rough Patch Complex: Old seed zones 481 and 491. New seed zones 10 and 14.
Devils Knob Complex: Old seed zones 491 and 492. New seed zones 10 and 11.
Skyline Ridge Complex: Old seed zone 492. New seed zone 11.
Bull Springs Cutoff: Old seed zone 702.
Bootleg Fire: Old seed zones 702, 703, 711, 712.
Cougar Peak Fire: Old seed zone 712.
Fox Complex: Old seed zone 722.

Overview of the Bootleg Fire while it was actively burning.

Overview of the aftermath of the Bootleg Fire.

Responses to 2024 Wildfires

After the catastrophic 2020 and 2021 fire seasons, the 2022 and 2023 fire season were relatively quiet. That relative calm was shattered with the unprecedented 2024 fire season . The 2024 fire season again proved to be the most active fire seasons on record. In 2024, a total of 1.93 million acres burned making it the most active fire season on record. There were six megafires in the state which are fires classified as fires exceeding 100,000 acres in size. Fires in western Oregon were relatively small with the Willamette Complex (28,345 acres), Cottage Grove Fire Lane 1 (25,951 acres), and the Larch Creek Fire (18,690 acres) representing the most significant fires in the area. In contrast, central and eastern Oregon had numerous, large scale fires. The most significant fires were the Durkee Fire (294,265 acres), Battle Mountain Complex (183,026 acres), Rail Ridge Fire (176,661 acres), Falls Fire (151,689 acres), Lone Rock (137,222 acres), Cow Valley (133,490 acres), Crazy Creek (86,968), Badland Complex (54,617 acres), Telephone Fire (54,005 acres), Flat Top (36,362 acres), and Shoe Fly (26,817 acres) were the most significant fires in central and eastern Oregon.



Map of Oregon showing major 2024 fires and the area impacted by each respective fire.

Responses to 2024 Wildfires

New stands established following these fires must be adapted to the specific growing conditions of each fire zone. For each of the major fires of 2024. The general seed zones impacted are:

Major Western Oregon Fires

Willamette Complex: Old seed zones 262, 471, and 472. New seed zone 2.

Cottage Grove Fire Lane 1 Old seed zones 262 and 471, New seed zone 2.

Larch Creek: Old seed zones 661 and 662. New seed zones 1 and 9.

Major Central and Eastern Oregon Fires

Durkee Fire: Old Seed Zones 882 and 883. New seed zone: Not available.

Battle Mountain Complex: Old seed zone 842, 853, 901. New seed zone: Not available.

Rail Ridge Fire: Old seed zone 921, 922. New seed zone 10.

Falls Fire: Old seed zones 941, 942 and 943.. New seed zone 10.

Lone Rock: Old seed zones 842, 901, 902. New seed zone 9.

Cow Valley: Old seed zone: 882, 883, 922, 930. New seed zone 10.

Crazy Creek: Old seed zones 902, 911, 921. New seed zones 9 and 10.

Badland Complex: Old seed zone 863 and 882. New seed zone: Not available.

Telephone fire: Old seed zone 942 and 943. New seed zone 10.

Flat Top: Old seed zone 690, 711, and 713. New seed zone 5.

Forest Seedling Nurseries

The following list of nurseries typically grow seedlings for reforestation and contacting these nurseries is a good starting point to secure planting stock. The Oregon Department of Forestry no longer runs a state nursery to produce seedlings, but the Department does offer seed for sale through the Oregon Seed Bank. Each year the Seed Bank updates its listing of seed sources and makes this seed available to nurseries and individuals needing to produce seedlings for reforestation. The Seed Bank often has the most advanced genetic sources of seed available and this availability allows Family Forest Landowners access to the latest developments through tree improvement programs.

Aldrich Berry Farm & Nursery, Inc.
190 Aldrich Rd
Mossyrock, WA 98564-9609
Phone: (360) 983-3138
Email: galdrich@tds.net
Website: aldrichberryfarm.com

Althouse Nursery
8576 Rogue River Hwy
Grants Pass, OR 97527
Phone: (541) 415-0849
Email: plants@althousenursery.com
Website: althousenursery.com

Brooks Tree Farm, Inc.
9785 Portland Rd NE
Salem, OR 97305-9721
Phone: (503) 393-6300
Email: office@brookstreefarm.com
Website: brookstreefarm.com

Champoeg Nursery, Inc.
9661 Yergen Rd. NE
Aurora, OR 97002
Phone: (503) 678-6348
Email: info@champoegnursery.com
Website: champoegnursery.com

Drakes Crossing Nursery
19774 Grade Rd SE
Silverton, OR 97381-9425
Phone: (503) 873-4932
Email: info@drakescrossingnursery.com
Web: drakescrossingnursery.com

Heritage Seedlings, Inc. *(shrubs)*
71st Ave. SE, Salem OR 97317
Phone: (503) 585-9835
Email: sales@heritageseedlings.com
Web: heritageseedlings.com

IFA Nurseries, Inc.
9450 SW Commerce Circle, Ste 370
Wilsonville, OR 97070
Cell: (541) 556-8907
Email: sakehurst@ifanurseries.com
Web: ifanurseries.com

Kintigh's Mountain Home Ranch
38865 E. Cedar Flat Rd.
Springfield, OR 97478
Phone: (541) 746-1842
Email: KMHRtree@aol.com
Web: kintighs.com

Klamath Forest Nursery
Green Diamond Resource Co.
7680 Happy Hollow Lane
Bonanza, OR 97623
Phone: (541) 545-6432
Email: ***jdixon@jw-tr.com***

Lava Nursery, Inc.
5301 Culbertson Dr.
Parkdale, OR 97041
Phone: (541) 352-7303
Email: lavanursery@aol.com

Lewis River Nursery
2821 NE 434th St
Woodland, WA 98674
Phone: (360) 225-6455

Lewis River Reforestation
1203 NW Hayes Rd.
Woodland, WA 98674
Phone: 360-225-6357
Email: bruces@lrrinc.com
Web: www.lrrinc.com

Forest Seedling Nurseries

Pitkin Forest Nursery, Univ of Idaho
1025 Plant Science Rd./ PO Box 441137
Moscow, ID 83844-1137
Phone: (208) 885-3888
Email: seedlings@uidaho.edu
Web: uidaho.edu/cnr/cfnsr

Plant Oregon (shrubs)
8677 Wagner Creek Rd
Talent, OR 97540
Phone: (541) 535-3531
Email: dan@plantoregon.com
Web: plantoregon.com

Plants of the Wild
123 Stateline Rd/ P.O. Box 866
Tekoa, WA 99033-0866
Phone: (509) 284-2848
Email: Carrie@plantsofthewild.com
Web: www.plantsofthewild.com/

The Plantworks, LLC
69465 Lantz Lane
Cove, OR 97824-8208
Phone: (541) 786-5122
Email: plantworks@oregontrail.net
Web: theplantworksllc.com

PRT Oregon
31783 South Meridian Rd.
Hubbard, OR 97032
Phone: (503) 484-0307
Email: katie.wilson@prt.com
Web: prt.com

Rooted Forestry
Oregon and Washington
Phone: (503) 805-1222
Email: sales@rootedforestry.com
Web: rootedforestry.com

Scholls Valley Native Nursery, LLC
4036 NW Half Mile Lane
Forest Grove, OR 97116
Phone: (503) 470-0420
Email: sales@schollsvalley.com
Web: schollsvalley.com

Silvaseed Company
P.O. Box 118 Roy, WA 98580
Phone: (253) 843-2246
Email: contact@silvaseed.com
Website: silvaseed.com

Tribal Nursery Plants
73820 Highway 331 Pendleton, OR 97801
Phone: (541) 278-8525
Email: tribalnativeplants@gmail.com

USDA Forest, J Herbert Stone Nursery
2606 Old Stage Rd.
Central Point, OR 97502
Phone: (541) 858-6100
Email: jbjustin@fs.fed.us
Website: https://rngr.net/resources/directory/usdaforestservice-jherbertstonenursery

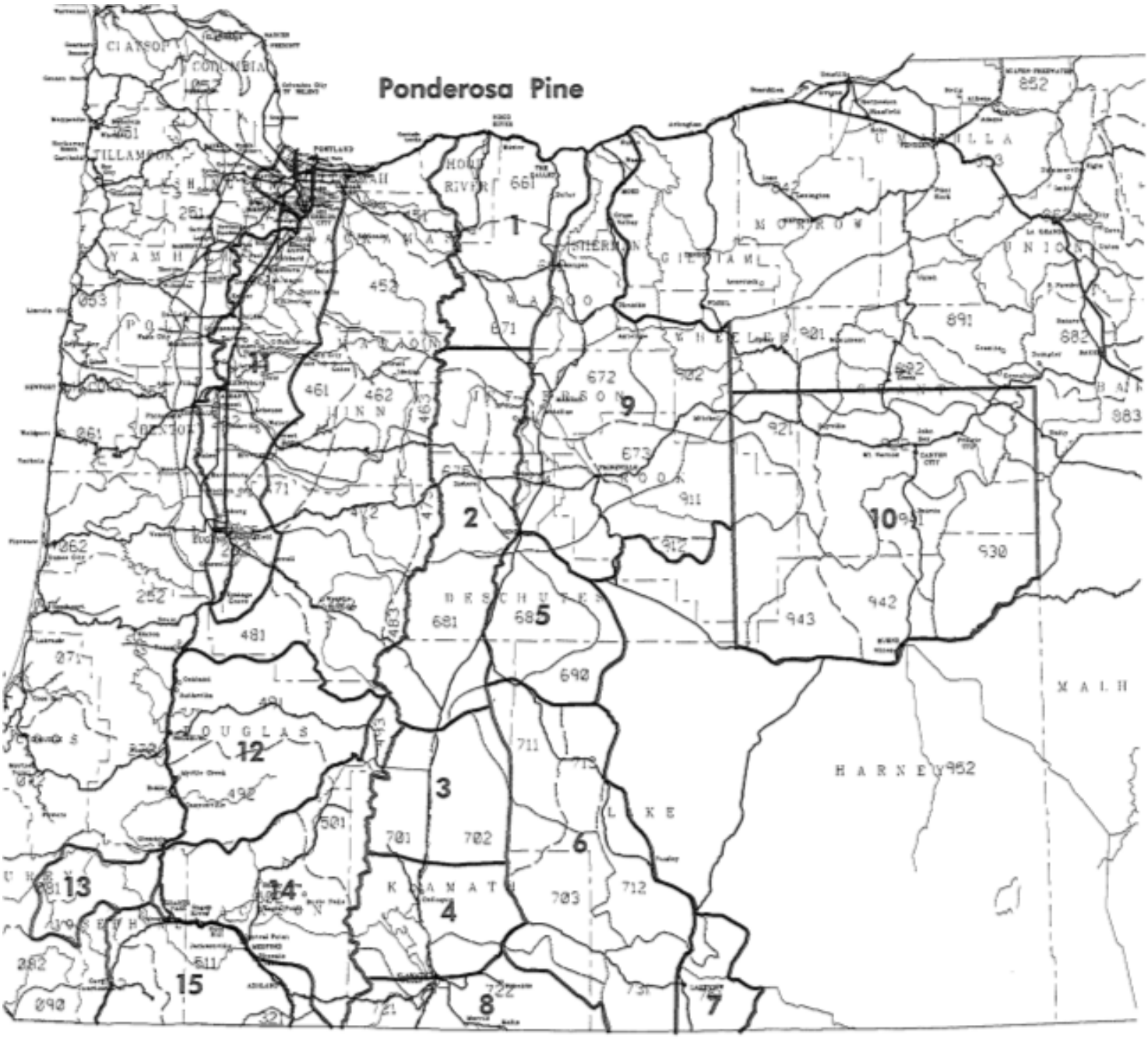
Washington Association of Conservation Districts (WACD) Plant Materials Center
16564 Bradley Rd Bow, WA 98232
Phone: (360) 757-1094
Email: pmcsales@gmx.com
Website: WACD Plant Materials Center

Webster Forest Nursery, Washington St. Dept. of Natural Resources
9805 Blomberg St SW (Physical Address)
MS 47017 (Mailing Address)
Olympia, WA 98504-7017
Phone: (877) 890-2626
Email: WebsterNursery@dnr.wa.gov
Website: Webster Forest Nursery | WA - DNR

Weyerhaeuser Company
6051 S Lone Elder Rd. Aurora, OR 97002
Phone: 360-858-5709
Website: ***weyerhaeuser.com/timberlands/seedling-sales/western-seedlings***

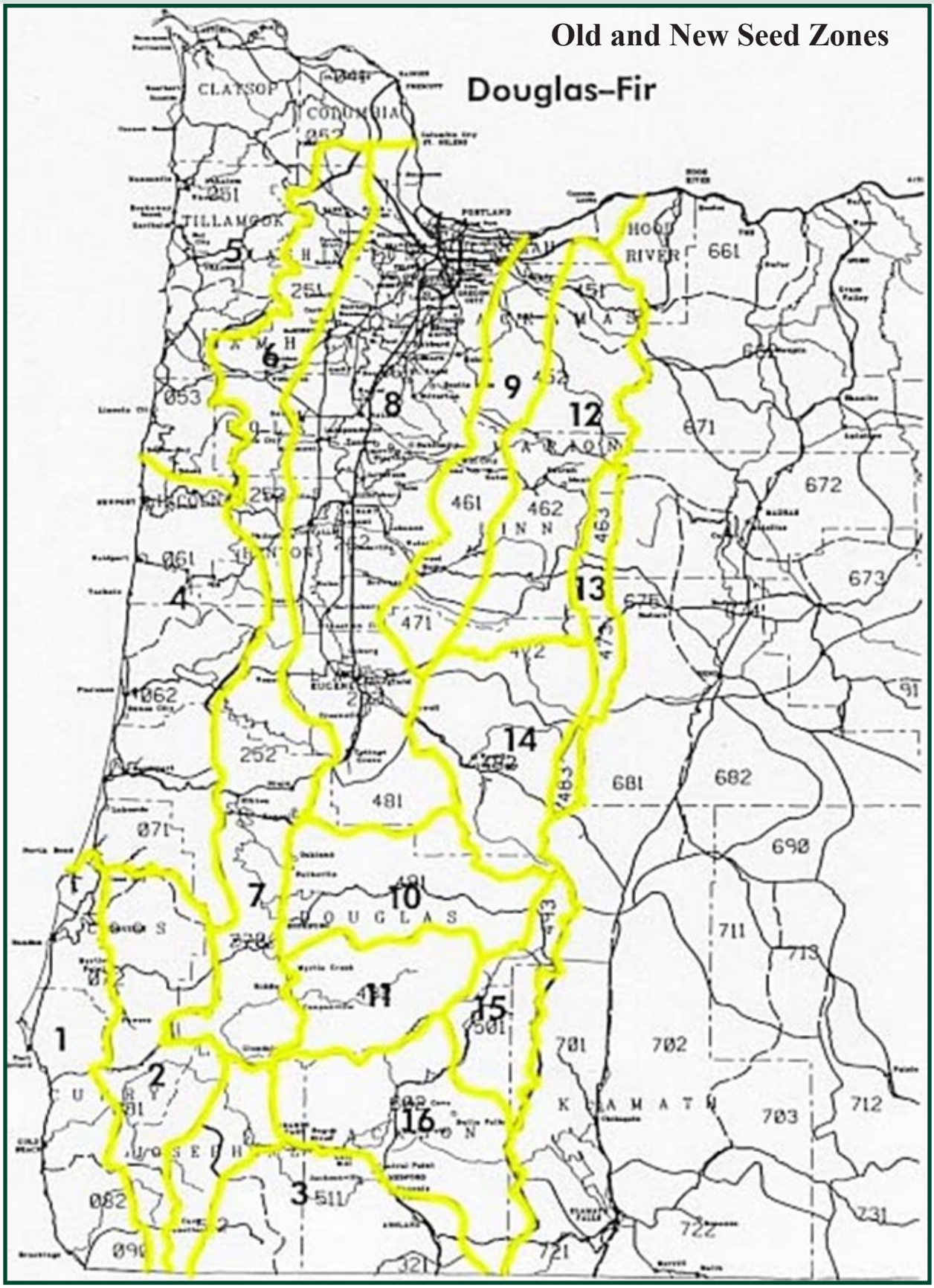
Willamette Seedling Nursery
23625 S. Mulino Rd, / PO Box 728
Canby, OR 97013
Phone: (503) 263-6850
Email: cparsons@canby.com

Seed Zone Maps

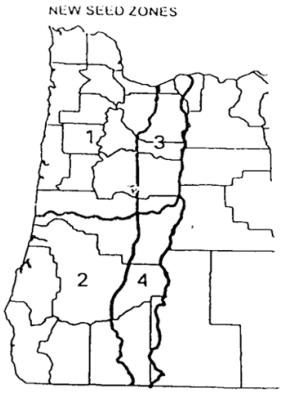


Zone 1–9,12–15	Zone 10	Zone 11
1000′ elevation	<5000′ = 1000′ elevation bands >5000′ = 700′ elevation bands	single elevation band

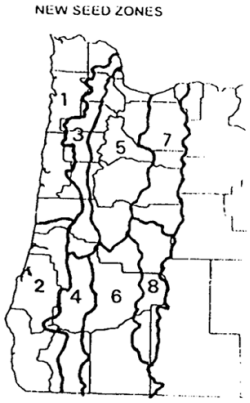
Seed Zone Maps



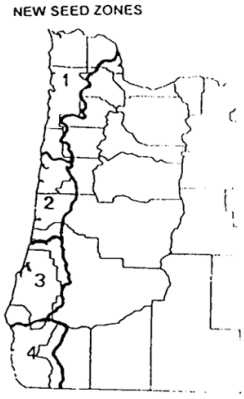
Seed Zone Maps



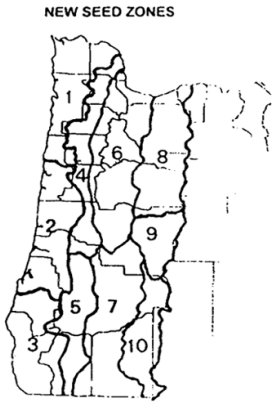
WESTERN RED CEDAR



WESTERN HEMLOCK

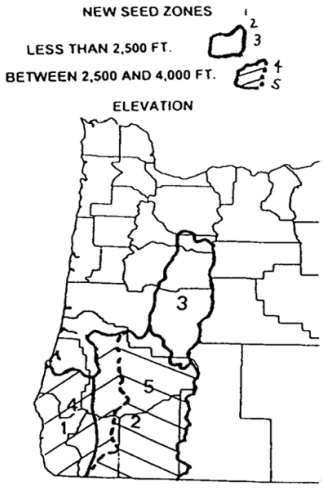


SITKA SPRUCE

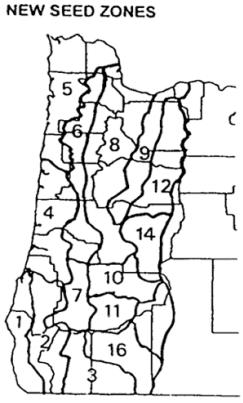


GRAND FIR

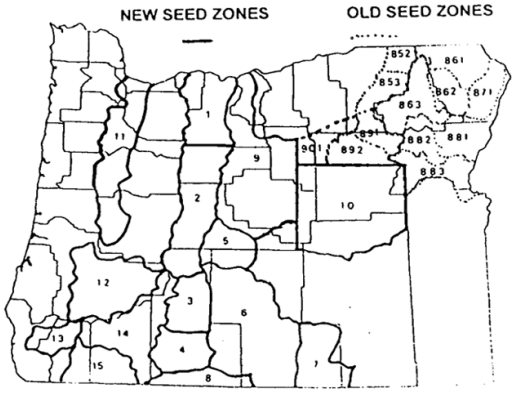
INCENSE CEDAR



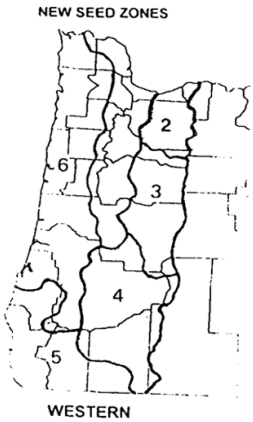
SUGAR PINE



DOUGLAS FIR



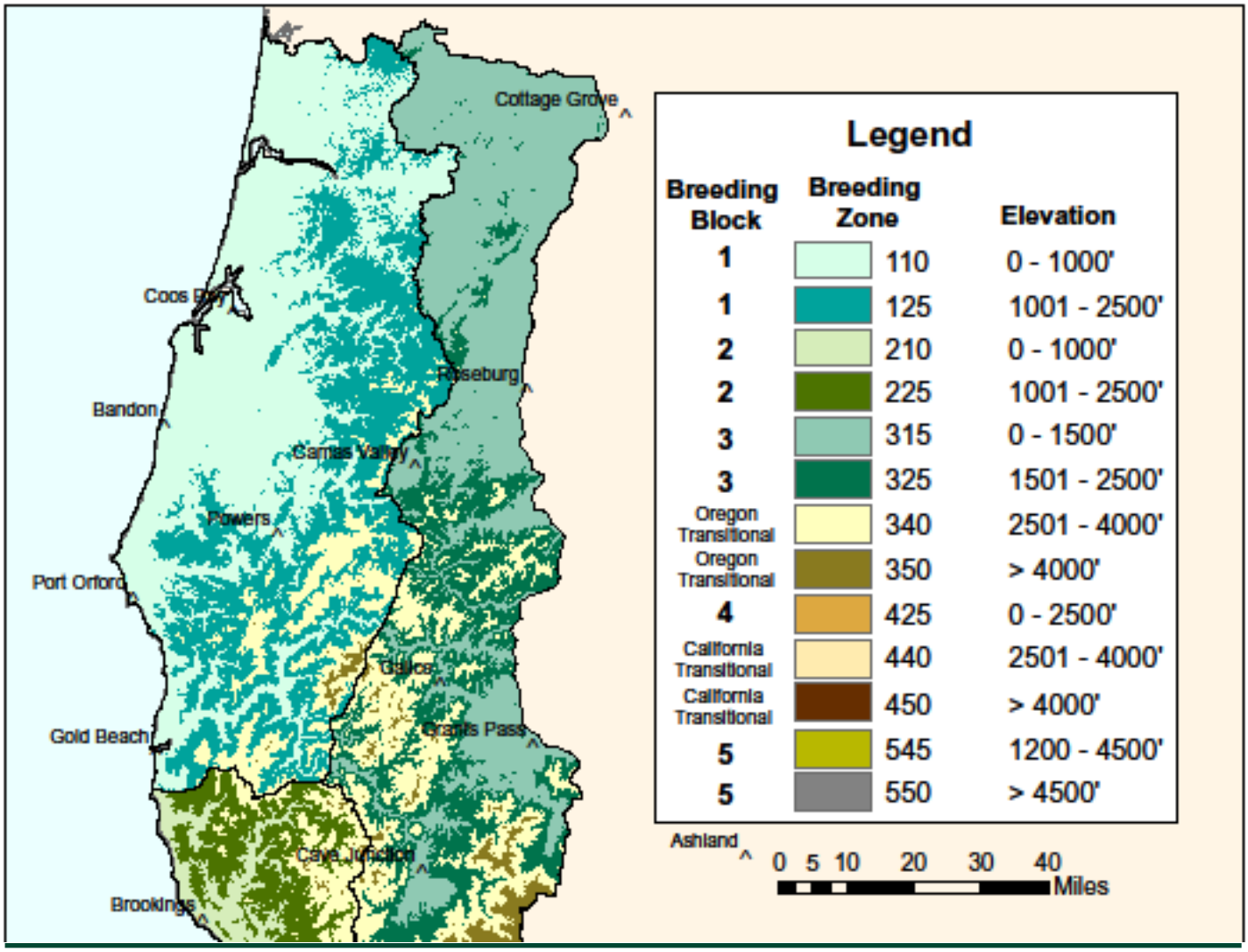
PONDEROSA PINE



WESTERN WHITE PINE

Seed Zone Maps

Port-Orford-cedar JR13 Breeding Zones



Additional Resources

Seedlings:

- **National Reforestation & Restoration Directory**
  https://npn.rngr.net/marketplace/directory
- **Oregon State University Ext Service**—Christmas Trees
  https://agsci.oregonstate.edu/sites/agscid7/files/nwrec/attachments/2020_nurseries_seedlings_list_4-2021.pdf
- **Private Forest Lands Network**—a refrigerated storage facility located in La Grande, Oregon. This facility can be used to store forest seedlings and shrub vegetation for your stream enhancement, riparian plantings, and wind break projects.
  https://www.facebook.com/PrivateLandsForestNetwork

Seed:

- **Oregon Seed Bank**
  The Seed Bank supports Family Forest Landowners across the state of Oregon by providing them access to superior tree seed for their reforestation needs.
  https://www.oregon.gov/ODF/Working/Pages/Seed.aspx

Publications:

- ***Guide to Reforestation in Oregon***, by Robin Rose and Diane Haase, 2006, OSU, OFRI, ODF
  https://www.oregon.gov/ODF/Documents/WorkingForests/ReforestationGuide.pdf

Websites:

- **Know Your Forest**—Resources for Small Landowners
  https://www.knowyourforest.org/
- **Oregon Department of Fish & Wildlife**
  https://www.dfw.state.or.us
- **Oregon Department of Forestry, Forest Resources Division**
  https://www.oregon.gov/ODF/Working/Pages/default.aspx
- **Oregon Association of Nurseries—Nursery Guide**
  http://nurseryguide.com/
- **Oregon Forest Industry Directory**
  http://www.orforestdirectory.com/
- **OSU Forestry Extension Program**
  http://extensionweb.forestry.oregonstate.edu/index.php
- **Oregon Watershed Enhancement Board**
  https://www.oregon.gov/OWEB
- **USDA Forest Service Dorena Genetic Resource Center**
  https://www.fs.usda.gov//detail/r6/landmanagement
- **USDA Natural Resources Conservation Service**
  http://www.or.nrcs.usda.gov/
- **ODF Stewardship Forester Listing Lookup**
  https://www.oregon.gov/ODF/Working/Pages/FindAForester.aspx
- **Oregon Small Woodlands Association**
  https://www.oswa.org

Reforestation...

Planting a new forest.

Step 1: Planning

Planning to reforest your property should take place before harvest begins. Site conditions will determine which seedling species and seedling size to order.

Legal Requirements

The landowner must replant within 24 months after a clear-cut or heavy partial cut. Planting requirements range from 200 trees per acre for most of western Oregon to 100-125 trees per acre for dry pine sites in eastern Oregon. By the end of the sixth year, the trees must be "free-to-grow" (healthy and above surrounding vegetation).

Step 2: Ordering

Order seedlings no later than the fall before planting season. Select the proper seedling, species, seed zone, and size for each site. Douglas-fir (western Oregon) and ponderosa pine (eastern Oregon) are common species, but there is a lot of variation. Please contact your local ODF office for information specific to your site.

Step 3: Planting

Once the site is prepared and the seedlings have been ordered, planting can take place from December through March (later for snow-bound sites). Proper handling of seedlings from the nursery through planting is critical, as is the planting technique. Plant more than the minimum number of trees per acre to allow for seedling losses.

Reforestation Crews can be hired to reforest your property. Contact your local ODF office for a list of local crews.

Step 4: Free-to-grow

Inspect the seedlings each year to ensure that they are alive and are free-to-grow. Vegetation control and additional tree planting may be necessary for the next 5 years after planting.

Additional Resources:

Reforestation Guidance
https://www.oregon.gov/ODF/Working/Pages/Replanting.aspx

Oregon State University Forestry Extension
http://extensionweb.forestry.oregonstate.edu/index.php

National Nursery and Seed Directory
https://rngr.net/resources/directory