Log Market Report
Current prices and trends

Why are my trees dying?
Don’t blame it all on the bugs

Armillaria root disease
A fascinating fungus on the Dry Side

Women’s Compass & Mapping Workshop
Hands-on training with Women Owning Woodlands

Prescribed Fire Practicum
Fire in an ecological context

Regional News
Central & South Central Oregon
Northeast Oregon
Baker, Grant, & Southeast Oregon

Life on the Dry Side
Serving land managers and owners east of the Cascades
IN THIS ISSUE

3  Log Market Report
   Current prices and trends

4  Why are my trees dying?
   Don’t blame it all on the bugs

8  Northeast Oregon News
   NE Oregon Firewise website goes live

9  Baker, Grant, & Southeast Oregon News
   Small Woodlands Chapter Youth Event & First Annual Meeting

10 Armillaria root disease
    A fascinating fungus on the Dry Side

13 Women’s Compass & Mapping Workshop
    Hands-on training with Women Owning Woodlands

14 Prescribed Fire Practicum
    Fire in an ecological context

15 Central & South Central Oregon News
    Regional fuels reduction & landscape restoration projects

16 Fare-tree-well and tree you later
    A note from Thomas Stokely, departing Forestry and Natural Resources Agent
Log prices at Dry Side mills have, for the most part, rebounded since our winter edition report. Grand/white fir prices are up by as much as $75 per MBF (thousand board feet) in some markets, and lodgepole/Engelmann spruce by $10 to $25 ($65 in Lewiston). Ponderosa pine prices increased in most markets, reaching $450 in central and south-central Oregon (the highest I've seen there in quite some time). Unfortunately, ponderosa prices are pretty weak in northeastern Oregon, with prices for large logs dropping by as much as $60 at the Pilot Rock mill. Douglas-fir prices were mostly up (strongly in La Grande and Elgin) but decreasing in the Pendleton area.

Pulp prices in the Columbia River Gorge remain high and have even strengthened, nearing $50 per ton. The Burns/John Day market is also buying, but at a lower rate. If you have small diameter thinning on your to-do list and are within a reasonable hauling distance to one of these mills, now might be the time.

With this much movement in the markets, it would be worth talking to your local log buyer or consulting forester to get the skinny on what’s happening locally. If you have good timber you may be able to negotiate better prices – but remember to take hauling distances and cost into account when making sales decisions.

**John’s Soapbox Speech:** Think about your overall forest management objectives when considering harvests. If your objective is maximizing timber income you may want to play the markets and watch trends. If your objectives are forest health, reducing wildfire risk, specific wildlife habitat, etc., then sticking to a relatively stable harvesting schedule is probably your best course of action.

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<th>LOG MARKET REPORT $/1,000 board feet (or ton)</th>
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One of the most common questions we Extension Foresters get is “Why are my trees dying?” That question is almost always followed up by “What insect is causing the damage?”

My counsel to landowners is that insects are rarely the primary culprit in tree death – the vast majority of tree problems in Oregon can be attributed either to weather conditions or to overcrowding, and it’s these underlying stressors that predispose trees to insect damage.

Here’s a quick run-down on what’s happening with Dry Side tree health:

**ADEQUATE MOISTURE**

Trees need adequate moisture to keep their defense mechanisms fully functional. When subjected to drought, trees may lack the resources needed to resist disease-causing organisms. Oregon’s tree-growing season tends to start with plenty of available moisture, but then enter a long dry period during which trees and other plants use up the water stored in the soil.

Ultimately, trees growing in overcrowded conditions; in marginal soils; in hot, dry sites (such as south and west-facing slopes); or those predisposed to disease will succumb to the forces of natural selection. Parts of central and eastern Oregon have experienced significant and persistent drought over the past few years, so it should be no surprise that susceptible trees would be experiencing significant mortality.

**EXCESSIVE HEAT**

Excessive heat can cause trees to display drought symptoms even when moisture is available in the soil. The vast majority of water consumed by trees is used to cool their leaf surfaces. On a very hot day a tree simply may not be able to move and evaporate enough water to meet its cooling needs, resulting in leaf damage and stress. The “heat dome” event of last summer, and the increasing number of hot days we’ve been experiencing in general, have led to early leaf loss in hardwoods (broadleaf species) and leaf scorch and mortality in conifers. This is particularly evident where tree species are at the “hot” edge of their natural ranges (i.e. lower elevations) and when situated on south and/or west facing slopes.

In Dry Side forests, grand fir and white fir are the tree species most commonly damaged by heat. They simply have very low tolerance to high heat, and you’ll almost certainly find dead or dying grand/white fir trees in the forests you visit. This should not be interpreted as a sign of poor overall forest health, rather it’s an indicator that nature is “weeding” out the trees least well adapted to those sites.

**DECLINE IS A PROCESS**

Many of the conifer trees that appear to be dying now actually started their decline over a year ago. Lack of moisture or too much heat led to stress, which led to reduced resistance, which facilitated insect invasion in
the stem and branches. The insects laid eggs and the resulting larva fed under the bark and in the wood. This further weakened the trees and encouraged additional insect invasion. Eventually, the trees were overwhelmed and died.

Once started, this process is very difficult, or even impossible, to reverse - and it’s common to see conifers die in the spring or early summer from damage caused in prior years. It is important to recognize that the insects are seldom the direct cause of these trees’ deaths; they merely take advantage of the trees’ weakened condition. Killing the insects will not save the tree if the underlying moisture deficiency is not addressed, and even this may not be sufficient if the tree is too badly damaged before action is taken.

**FOREST PESTS**

Several common forest pests take advantage of drought/heat-stressed trees. These include bark beetles and wood borers that populate tree stems, beetles and weevils that invade branches, and fungi species that cause stem and/or branch cankers. Insect and fungi species are generally specific to their host tree species, so, for instance, the things that attack Douglas-fir are unlikely to also attack ponderosa pine.

Bark beetles and borers spend portions of their lives in the stems (under the bark) of stressed, dying or dead trees. Signs of their presence include holes in the bark, boring dust, or “chewing” sounds. (You may also observe an increase in woodpecker activity, as these birds seek out the beetles in and under the tree’s bark.) Beetle species often prefer a specific portion of the stem or branch where the bark thickness is most conducive to their needs. You may find one species near a tree’s top or in branches, another in the mid-portion of the stem, and a third at the base of the stem. Note that by the time you notice the damage, such as reddening needles, the insects may be long gone.

Treatment of bark beetles and borers using insecticides is challenging in forest settings – this approach is probably best reserved for high-value trees in home landscapes and recreation areas. Applying insecticides to the stems, either to keep the beetles out or to penetrate the bark and kill them, is difficult to effectively administer on large trees. High-value ornamental trees may be treated through stem injections or soil drenches - techniques that are fairly well developed for hardwood trees but less so for conifers. It’s generally best to have these treatments carried out by an arborist or landscape professional with the appropriate training, equipment, and certifications.

There is a novel option for protecting pine trees from the mountain pine beetle. By applying the synthetic pheromone Verbenone you may be able to trick the beetles into thinking that the tree has already been fully invaded by other mountain pine beetles and is no longer suitable habitat. This discourages them from attacking the tree. Verbenone is available in pouches that you staple to the tree, or in a “caulking” tube useful for application to larger numbers of trees. A small amount, applied before mid-June, can be quite effective as long as the stand of pines has not already been significantly attacked.

See [https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5373188.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5373188.pdf) for a nice overview of this option.
THINNING

Trees growing close together will compete with each other, and the effect will become more extreme as they get larger. Eventually, some will be out-competed and perish. You can improve the health of a forest stand by reducing the number of trees to increase the amount of water and nutrients available to remaining trees. Thinning works best when done before trees become unhealthy from over-competition, so don’t expect it to save a stand of trees that has already become weakened.

Foresters have a variety of methods for determining how many trees can occupy a site, but you can get close using the “D times” method. For much of central and eastern Oregon, spacing of D times 1.25 plus 2 works well. Let me interpret. D is the tree’s diameter at breast height (dbh, measured at 4.5 feet above ground on the uphill side). If a tree has a 10” dbh, the spacing to its nearest neighboring tree should be 10 times 1.25 plus 2, or 14.5 feet. A 20” dbh tree would need 20 times 1.25 + 2 = 27 feet. These represent the upper end of how dense the forest should be – so you should actually thin to even wider spacing (I recommend D*1.5+2). Your forest doesn’t need perfectly uniform thinning – it can have some clumps and gaps – just average things out to meet the spacing guideline.

Trees harvested during thinning may be sold as logs if they are still in good condition or used for firewood. Small trees and slash (tops and branches) should be piled and burned to minimize fire risk. They can also be masticated (ground up) in place. (Be sure to file a notification with the Oregon Department of Forestry before selling logs, and to comply with burning regulations.) You do not need to remove all the dead and dying trees – leaving some to form snags or downed logs can provide important wildlife habitat. And, if you have trees that are already fully dead they are probably no longer a bark beetle risk to surrounding trees – the beetles will have moved on already.

This said, **you should be diligent about cleaning up pine slash.** Recently killed pine stems and branches with diameters ranging from 3” to 8” are prime habitat for the pine engraver (Ips) beetle. These critters will invade and produce three or even four new generations of beetles in a single year, and if they run out of slash they’ll invade the small stems and branches of surrounding pines (including tops of large trees). Pine engravers can cause a lot of damage, so it’s best to treat pine slash promptly. This Oregon Department of Forestry fact sheet is a great resource on managing Ips beetles, with clear guidance on slash management at differing times of the year: [https://www.oregon.gov/odf/Documents/forestbenefits/ips.pdf](https://www.oregon.gov/odf/Documents/forestbenefits/ips.pdf).

GENERAL ADVICE ON KEEPING TREES HEALTHY

1. **Manage vegetative competition around young, planted trees.**

Grasses, herbs, and shrubs can be very competitive with young trees, consuming vital moisture or, in the case of shrubs, limiting trees’ access to light. Mowing or trimming the competing vegetation may alleviate shade issues, but it does little to reduce moisture consumption. Appropriate vegetation control with herbicides or manual removal of grasses and forbs from an area three to five feet around the base of a young tree will reduce competition and increase both tree seedling survival and growth rate. This is most important for the first three to five years after the tree is planted or established. Note that my advice is to make use of natural regeneration (rather than planting) in Dry Side forests, but if you do plant, plan to conduct diligent vegetation management.

2. **Individual yard trees will benefit from infrequent, deep watering during the dry season.**

Watering your forest trees is probably not a viable option, but you may be able to provide supplemental water to yard trees. Don’t assume that watering your lawn will

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Pine slash should be managed promptly to reduce risk of pine engraver beetles invading surrounding pines. Photo: John Punches.
supply the needs of trees. (Lawns get frequent but shallow watering. Trees respond best to infrequent, deep watering.) Use a soaker hose, spread around the tree about 2/3 of the length of the branches from the stem, and let it run for several hours to get the soil well saturated. Trees generally need the equivalent of one inch of rainfall per week from June through September, but allow soil to dry out between waterings – many trees will not tolerate persistent flooding in their root zones. Trees on steep slopes or other fast-draining areas, or those competing with other vegetation, may need more frequent watering. Cease watering by the end of August – many tree species need some drought stress to induce them into winter hardiness, and watering too late in the year can leave them susceptible to freezing damage. Consider mulching over the rooting zone of yard trees to conserve moisture, reduce soil temperatures, and help reduce vegetative competition.

3. Plant or favor trees well suited to the site.

When thinning, favor (leave) trees that will be best suited to the site. For instance, on dry upland sites favor ponderosa pine, but feel free to leave Douglas-fir on the more moist north and east facing slopes. If planting trees, utilize species well adapted to the soil, moisture and temperature conditions that can be expected on that site. I always recommend use of native tree species, and obtaining seedlings grown from seed appropriate for your location and elevation.

4. It’s not all about drought and bark beetles.

Trees face a wide variety of pests and disease, and while drought, heat, and bark beetles are common culprits in tree mortality they are certainly not the only ones. Trees can experience:

- Insect feeding on, or fungal infection of, leaves/needles
- Fungal decay or disease in stems and roots
- Insect or fungal damage to buds, cones, or fruit
- Invasion by parasitic plants (such as true or dwarf mistletoe)
- Damage from animals such as deer and elk, bear, porcupine, squirrels, beaver, etc.

Visit the Know Your Forest website and check out the Learning Library for access to fact sheets on a full range of Oregon’s forest pests and diseases. [https://knowyourforest.org/learning-library/forest-health](https://knowyourforest.org/learning-library/forest-health). If you have questions, consult your local OSU Extension Forester or Oregon Department of Forestry Stewardship Forester.

5. One final point... It's normal for trees to die.

The conditions we are currently experiencing in Dry Side Oregon rarely represent an insect or disease epidemic. It is much more likely the dead trees you’re seeing are the result of drought or heat stress. Even with perfect weather and trees perfectly suited to their site, there will still be mortality as trees grow and compete. Healthy forests include dead trees; it’s part of nature’s plan.

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**PITCH ON YOUR CONIFER STEM?**

You may have noticed streams or globs of sticky “pitch” running down the stem of your conifer. This is called resin and is one of the tree’s most effective means of protection against insect attack. When the bark is penetrated the tree produces resin to flood the wound, sealing out disease-causing organisms and often flushing out or drowning bark-boring insects. Without adequate moisture, the tree is unable to produce enough resin to do the job, and insects can successfully invade.

If your tree is producing a lot of clear or white pitch it tells us that the tree has been damaged but is still fighting back. You should resist the urge to cut down a tree producing a lot of light-colored pitch, as it still has a fair chance of recovery. If the pitch is reddish the tree has been more extensively damaged and is less likely to survive.

Visit the Know Your Forest website and check out the Learning Library for access to fact sheets on a full range of Oregon’s forest pests and diseases. [https://knowyourforest.org/learning-library/forest-health](https://knowyourforest.org/learning-library/forest-health). If you have questions, consult your local OSU Extension Forester or Oregon Department of Forestry Stewardship Forester.

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Pitch tubes associated with a mountain pine beetle infestation. The numerous pitch tubes indicate this tree has almost certainly been overwhelmed and will perish. Photo: Steven Katovich, Bugwood.org
The NE Oregon Firewise website is up and running at https://www.neoregonfirewise.org/. This is a new resource for any communities and residents interested in learning more about being prepared for wildfire and creating more resilient communities. The effort is truly a partnership across the region and is a great resource to visit if you are interested in learning more!

Speaking of Firewise, several NE Oregon communities were able to secure funds from the Senate Bill 762 grant opportunity for this year. On the ground implementation work is being conducted as you read this in communities including the Lostine Canyon Firewise Community in Wallowa County (~$75K), Pine Valley Firewise Community in Baker County (~$63K), and Ritter Firewise Community in Grant County (~$10k). These projects are each unique in their implementation approach and the funds will be used to reduce fuels in the communities and improve resilience in the face of future wildfires. Community leaders and partners across the region have come together to ensure the funds are allocated to optimize the project dollars and ensure positive project outcomes. An incredible amount of work goes into planning these projects and implementing them in a safe and efficient manner. Thankfully the partners in the region have the tools and understanding to accomplish the project goals within the tight timelines and local landowners have been eager to pitch in to ensure the treatments are effectively implemented in their communities. Stay tuned for project updates to learn more as they near completion.

Additionally, partners in the region were able to secure funds from the Small Forestland Grant opportunity, also through SB762. The NEO Strategic Defensible Space Grant project awarded funds to the Morgan Lake Defensible Space Project in Union County, Northwest Union County Defensible Space Project in Union County, and Hurricane Creek and Ferguson Ski Hill Defensible Space Project in Wallowa County. Over $175,000 is in contract to conduct these operations across the region. This project will support strategic wildfire risk reduction and defensible space projects among groups of small forestland owners in high-risk watersheds as identified within each county’s Community Wildfire Protection Plan. The funds were obtained through a strong collaboration with Oregon Department of Forestry, Blue Mountain Cohesive Strategy, Oregon State University Extension, Wallowa Resources, County Emergency Management, the Northern Blues All Lands Restoration Partnership, and others. Wallowa Resources is acting as the fiscal sponsor and Oregon Department of Forestry is providing technical assistance capacity and oversight including project inspection and making the call on satisfactory completion for all contracting and project activities. More updates will be shared as these projects near completion.

SB 762 D-Space and Firewise Project Map:
Orange = Union
Purple = Wallowa
Pink = Baker
Yellow = Grant
SMALL WOODLANDS CHAPTER YOUTH EVENT & FIRST ANNUAL MEETING

The Northeast Oregon Small Woodlands Association (NEOSWA) has continued its momentum into 2022. This spring we have held two big events, including a youth education field day with Baker High School Students and our first ever Annual Meeting and Tour. The Valerio Family was gracious enough to host both of these events at their tree farm near Medical Springs and offered two excellent days out in the woods. Seven Baker High School students learned about different tree species, forest health issues, using forest management to meet objectives, forestry and natural resource careers, and had the opportunity to see different equipment that a small woodland owner utilizes in the forest. They even had a chance to test their skills with a crosscut saw.

The following day, NEOSWA members and other small woodland owners from across Northeast Oregon attended the first NEOSWA Annual Meeting and Tour. While the weather wasn’t cooperating, we didn’t let that stop us, hearing from speakers about management planning, meeting management objectives, fuels reduction, forest health, and much more. The tour also featured a demonstration of a masticator and other equipment relevant for a small woodland owner. 36 small woodland owners, friends, and neighbors were able to join us for the event, braving the rain, and were rewarded with a fantastic buffalo burger lunch.

These events are just the first of many, and we want to encourage YOU to attend! If you are a member of the Oregon Small Woodlands Association in Baker, Grant, Union, or Wallowa County, or are interested in learning more, contact NEOSWA President Debi Lorence by email (debilorence@gmail.com) or phone (541-604-1151). Additionally, check out our website for updates, resources, and our newsletter The Blue Mountain Forester.

https://neoswa.com

STRATEGIC PLANNING AND PARTNERING FOR WILDFIRE RISK REDUCTION

One of the things that makes managing rangeland wildfire difficult is that we all need to work together within a socially- and biophysically-relevant area to reduce our collective risk. In Southeastern Oregon, we have a lot of public land, meaning a bunch of different partners, tools, and authorities all have to be mixed and matched across landownerships. Only then can we undertake wildfire risk reduction activities at scales that are meaningful for managing wildfire.

Recent funding awarded through Senate Bill 762 aims to, “Help Oregon modernize and improve wildlife preparedness through three key strategies: creating fire-adapted communities, developing safe and effective response, and increasing the resiliency of Oregon’s landscapes.” The Southeastern Oregon Wildfire Resiliency Project (SOWR) received $5 million to implement vegetation and fuels management projects. The SOWR proposal involved more than 20 individuals and organizations that strategically identified projects that would complement existing and planned treatments across private, state, and federal lands in Stinkingwater Mountains, Beaver Tables and areas near Juntura and Jonesboro in Harney and Malheur Counties. This project offers a potential model for the collective action needed to reduce wildfire risk across large, multi-jurisdictional landscapes.
Armillaria root disease can be a serious issue for tree growers on the Dry Side, but the fungus is native and plays an important role in the ecology of Dry Side forests. The fungus that causes Armillaria root disease in conifers is typically thought to be Armillaria ostoyae. This species is considered the most important in terms of damage to conifers in the northern hemisphere. However, Armillaria root disease around PNW and the globe is caused by many different species. In fact, there may be two or more closely related Armillaria species within any given forest stand in Oregon. Some Armillaria species are strictly saprophytic (only decompose wood, don’t kill things), or may be present only on shrubs and hardwoods, or be weak pathogens that attack trees of low vigor. For this discussion we focus on Armillaria ostoyae because it is so amazing, but also because it is the primary pathogen causing root disease affecting managed stands and plantations on the East Side, especially in the mixed conifer forest type.

Armillaria root disease is common across central and eastern Oregon, but the effects of Armillaria on tree mortality varies with tree species, location, and environment. East-side Douglas-fir (Interior variety), white, Shasta red and grand firs can be severely damaged by Armillaria, while ponderosa pine, lodgepole pine, and Engelmann spruce are moderately damaged, and incense cedar and western larch are seldom damaged. There is a lot of variation in ponderosa pine susceptibility; in some regions Armillaria can severely damage ponderosa pine but in other areas will rarely kill the tree. For example, in mixed conifer forests where ponderosa pine is an early successional species it is rarely killed by Armillaria, yet Armillaria is abundant and routinely kills Interior Douglas-fir and grand fir in these forests. Therefore, foresters often shift stand species composition to ponderosa pine and western larch to avoid damage. On the other hand, there is a particularly well-studied stand of ponderosa pine with highly pathogenic Armillaria creating infection

Above: Armillaria ostoyae mushrooms at the base of a dead true fir (Abies species). The mushrooms are young and not fully expanded. Left: Armillaria ostoyae mushrooms at the base of Douglas-fir. Photo: Mike McWilliams. These mushrooms are older and have dispersed spores. Note the scaly upper surface of the cap. An annulus (ring) will form around the stalk after the mushroom fully expands. The spore color is white.
centers and killing trees east of Mt. Adams in Washington state and ponderosa pine mortality caused by Armillaria root disease can be found surrounding the Black Butte area in central Oregon.

IDENTIFICATION

Armillaria is most easily identified by the mushrooms it forms. Called the “honey mushroom” (Figure 1) the fungus is edible, but not entirely enjoyed by everyone. Around one in eight people can get an upset stomach from eating these and people shouldn’t eat too many at once. The mushroom has a classic form, with gills, a scaly honey-colored upper cap, an annulus (ring of fungal tissue) persists on the stalk after it is fully expanded, and the spores that are white in color. The mushrooms often occur in clusters at the base of infected trees. However, the mushrooms are ephemeral and only occur for short periods of time, typically in fall after the rains have begun.

Typical symptoms of a tree with Armillaria root disease include chlorotic (yellowish) foliage color, thin or rounded crowns, reduced height growth, and a stress cone crop. The tree may have basal resin flow, or resinosis (Figure 2). However, black stain root disease and other issues may cause basal resin flow, so it is important to chop the bark away and examine the bark/wood interface for fungal tissue that has formed sheets or mats under the bark, often fan shaped (called mycelial fans). The combination of basal resinosis and mycelial fans under the bark in roots or at the root collar confirms Armillaria root disease.

Armillaria also forms black shoestring-like structures called rhizomorphs (Figure 3) which aid in the spreading of the fungus. Rhizomorphs can grow through the upper soil layers from a root or stump and infect nearby trees’ roots several feet away. Another name for Armillaria root disease is the “shoestring root rot” due to these rhizomorphs. Armillaria causes a white rot (decomposes both cellulose and lignin leaving no residue) in which the advanced decay can be wet, yellowish, and stringy.

IN THE FIELD

In the field it can be tricky at times to confirm Armillaria root disease killed a tree, especially if the tree has been dead for over several years. This is due to other fungi invading the tree, or possibly a saprophytic Armillaria may invade recently dead or declining trees. A saprophytic Armillaria can also form mycelial fans and rhizomorphs. Therefore, we usually don’t confirm Armillaria as the cause of tree death/decline unless we see evidence the tree put up a fight, i.e. pitching or basal resin flow and compartmentalization of the fungus. It is best to find trees that are recently dead (with red foliage), or strongly in decline and search for basal resinosis and mycelial fans by digging around the base of the trees and exposing the root crown and perhaps one or two large lateral roots.

Right: A. Basal resin flow associated with Armillaria root disease. B. Note we have also chopped under the bark to expose distinctive fungal mats (or sheets) under the bark. These fungal mats may be shaped like fans. C. Mycelial fans under bark on Douglas-fir. Photo: Mike McWilliams. D. Black shoestring-like rhizomorphs of Armillaria ostoyae. In this case they are under the bark, but these can also grow thru upper soil layers and be a primary mechanism of spread below ground.
*Armillaria* can behave in several ways within a stand. In some cases, the fungus will be widely distributed in the stand, but may only kill stressed and weakened trees of low vigor. However, in other cases a highly pathogenic *Armillaria* may cause distinct root disease centers or pockets where one or several clones of the fungus dominate the site. In a root disease center (Figure 4), there are typically trees with crown symptoms, dead trees (snags), and larger down trees, often crisscrossed. If trees were killed in a windstorm, they tend to all lay in the same direction, not crisscrossed. If bark beetles attack a stand, the trees die at a similar time and the snags will all be in a similar decay class (stage of decay). In a root disease center trees are killed in a chronic fashion and therefore there will be snags in various stages of decay.

If you are stumbling around in the forest at night, you may come across foxfire, the bioluminescent fungi in wood, which are mostly thought to be *Armillaria* species! As if *Armillaria* wasn’t amazing enough; these fungi can be bioluminescent!

**DISEASE SPREAD**

Although *Armillaria* forms mushrooms that disperse millions of spores, the role of spores in reproduction and spread is poorly known or documented. It appears that *Armillaria* spreads primarily below ground across root contacts, root grafts (places where roots of different trees of the same species grow together), and via attachment of rhizomorphs onto roots thru the upper soil. In addition, *Armillaria* will persist on cut stumps, possibly for decades (at least 35 years in some cases), and can spread to regenerating trees around old infected stumps. In some areas a single clone of the fungus will dominate an infection center. A clone is a single individual that can reproduce/spread asexually. In *Armillaria* a single clone can occupy large areas and cause mortality across the site for centuries or longer. In this case *Armillaria* can become a disease of the site, making eradication very difficult. Infection centers spread very slowly, however, perhaps around one to three feet per year. Trees can be infected without showing aboveground symptoms, especially if only a single root is infected, so the exact margin of the root disease center is difficult to determine. Usually we delineate the margin of the center by looking for dead trees, then symptomatic trees on the outer margin. Once we estimate this center, we go another 50 feet beyond the margin of the healthy trees to estimate the actual distribution of the fungus.

**THE HUMUNGOUS FUNGUS**

East of Prairie City, Oregon, on the Malheur National Forest, several large *Armillaria* clones have been discovered. One of these clones covers 2,385 acres and it is thought to be the world’s largest living organism! An epic Oregon Public Broadcasting, Oregon Field Guide segment created about the humongous fungus is well worth watching: (https://www.opb.org/television/programs/oregon-field-guide/article/oregon-humongous-fungus/) (only 7.5 minutes). A clone this large has likely been around for over 2,000 years! How could a single clone grow to dominate such a large area? We don’t really know, but it shows the amazing ability of *Armillaria* to persist and spread as clones.

**ECOLOGICAL ROLE OF ARMILLARIA ROOT DISEASE**

The forests on the dry side have been profoundly influenced by fire suppression and past cutting of the largest trees. Today, most people agree that within the ponderosa pine and mixed conifer forests the tree density is greater, average tree size is smaller, stands are more uniform, there are a legacy of large old stumps, and Douglas-fir and true firs such as grand fir are more abundant than ever. The combination of increased tree density combined with a shift in dominance to Douglas-fir and true firs have allowed *Armillaria* to thrive. Higher tree density has allowed more root-to-root contacts and grafts which facilitate spread, while abundance of large old stumps allows for persistence of *Armillaria* on site. In
a sense, *Armillaria* is acting as a stand thinning agent in some cases, creating diversity in stand structure and shifting composition to tree species that are more tolerant of *Armillaria* root disease (ie. western larch, incense cedar, and ponderosa pine) if seed sources are present for these other tree species. Historically, *Armillaria* may have been minimized by patchy and clumpy forest structure and diverse species composition, with more openings and lower overall density.

Managing *Armillaria* root disease requires an awareness of its local behavior and ecology. In particular, knowing the tree species being locally killed by the disease can tell you which alternative species to favor or use. Avoiding planting next to infected stumps, increased spacing of trees to reduce root contacts and grafts in tolerant tree species, and shifting species composition to trees tolerant/resistant of the disease are recommended management options. In some ponderosa forest types, however, there is no alternative species, and in these cases reducing tree density and/or creating patchy forests with more clumped trees and openings that mimic historical forests may be the best management option. In the mixed conifer forest, shifting species composition away from Douglas-fir and true fir species is the best option for *Armillaria* impacted sites.

*Armillaria ostoyae* is a native fungus on the Dry Side that can profoundly influence stand management, especially if it is not detected or noticed. Being aware of its presence and role in the local stand ecology can provide insight into management. Avoiding homogenous Douglas-fir and true fir forests is a good first step! It is very difficult, if not impossible, to eradicate *Armillaria* from a forest stand. Therefore, managing it as a “disease of the site” is the best approach. However, the disease is not everywhere, and you should not worry about *Armillaria* unless you have identified a specific problem with trees being killed by *Armillaria* in your stand, as it spreads very slowly and is unlikely to suddenly show up in a forest stand.

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**REFERENCES**


In mid-May several Extension foresters and fire aficionados (Punches, Rizza, and Putney) teamed up with OSU’s Fire and Silviculture specialists (Daniel Leavell and Steve Fitzgerald, respectively) to offer an intensive two-week course on prescribed fire. The pilot program’s small cadre of participants included a forestry graduate student, a fire risk assessment GIS contractor, and a logging contractor.

The course was designed to walk participants through the process of planning, implementing, and assessing a prescribed fire in Dry Side Oregon, and had a specific emphasis on understanding our region’s native fire regimes and our forests’ need for, and resilience to, surface fire. We studied planning concepts and developed a burn plan, and learned how to assess fuel types, conditions, and loading. We conducted field trips to learn about land manager objectives for the prescribed fire programs run by the Confederated Tribes of the Umatilla Indian Reservation, and The Nature Conservancy’s Zumwalt Prairie. We delved into fire behavior modeling and ran analyses to anticipate fire conditions and effects for our specific site. And we went through all the steps needed to meet Oregon Department of Forestry and other local fire and smoke management requirements (and even carried out neighbor notifications).

The crux of the course was realized on May 17, when we implemented the burn on an approximately five-acre unit on OSU’s Oberteuffer Research Forest, east of Elgin. The unit (ponderosa pine overstory with a light loading of needle litter and some scattered thinning slash) had been selected to provide a realistic burn experience while being easy to manage and very safe for participants. Prior to the burn day, pockets of dense regeneration had been strategically thinned, containment lines installed, hose lays practiced and tested, and ignition strategies thoroughly discussed. Burn day conditions were on the “low end” of our burn prescription, meaning the fuels were moist, temperatures cool, and relative humidity high – making for a very safe learning environment. Students put a lot of fire on the ground, practicing a wide array of firing techniques. They rotated through firing (ignition) and holding (containment) roles, and instructors threw in a few mocked-up spot fire experiences to keep them on their toes. We followed up afterwards to monitor burn results and do a final check to ensure the burn area was fully extinguished.

**Why all this effort?** Fire has played an essential role in Dry Side forests since time immemorial. Lacking fire our forests tend to become overly dense (too many trees per acre) and their species composition shifts toward shade tolerant species like grand and white fir, which form ladder fuels and increase risk of crown fire. We are convinced of the value of prescribed fire as a management tool and used the Practicum to test ways to teach prescribed fire concepts and practices to varying audiences. We hope this article peaks your interest, and we encourage you watch for and take advantage of prescribed fire learning opportunities we plan to offer starting this fall!

By John Punches, Extension Forester
After some eerily dry moments this winter, many were thankful for the spring rains brought by La Niña this year. However, the rains have not been enough to pull us out of the multi-year exceptional drought for much of central and south central Oregon. Local land managers and natural resource professionals are worried about public complacency for hazardous fire conditions out of a misunderstanding of the rains’ impact on current fuel conditions. Thankfully, many collaborative projects have been spearheaded in the past year to get work done on the ground for fire mitigation and land stewardship.

The Klamath Lake Forest Health Partnership had a successful meeting to update and strategize on the group’s vision for the future of their collaboration. This spring, they held a field tour of different sites that demonstrated the use of the various grants awarded to them and their partners, including ODF Western States projects, Chiloquin Community Forest & Fire project, and Good Neighbor Authority/Federal Forest Restoration Projects. Upcoming work on the Lake County All Lands Restoration Initiative (LCALRI) is being planned for the North Warner and Thomas Creek areas, including prescribed fire on private lands.

Many fuels reduction and landscape restoration projects have kicked off in central Oregon this spring as a result of grants awarded through senate bill 762. The Central Oregon Shared Stewardship Landscape Resiliency Project (COSSLRP) was awarded $6,257,878 and the Wasco County Forest Resilience Project was awarded $1,216,742. The projects include cross boundary, multijurisdictional work to improve landscape resiliency to wildfires. Another exciting result of SB 762 is the development of the Oregon Youth Conservation Corp to assist with creating defensible space in underserved communities. The non-profit organization Heart of Oregon will be coordinating and leading the youth group projects throughout the region.

The Klamath Lake Forest Health Partnership held a tour of sites where recent work had been done to improve forest resilience and mitigate wildfire risk.
FARE-TREE-WELL AND TREE YOU LATER

By Thomas Stokely, departing Forestry and Natural Resources Agent

About a month ago, I started a new position as the Forest Ecologist with The Nature Conservancy (TNC) here in Central Oregon. It was a difficult decision to leave OSU Extension, but the forest was calling me in another direction - one that I had set out on years ago when joining OSU as a graduate student. I very much appreciate the time I spent with our OSU Extension Staff and many of you along the way. I learned so much, gained great experiences, and made many connections that I hope to foster in my new role; all this despite moving to Central Oregon during an ongoing global pandemic.

In my new capacity I plan to continue collaborating with our Extension Foresters and Fire Team and hope that I can keep you in the loop by writing guest articles about conservation practices for future Life on the Dry Side newsletter editions.

What will I be working on with TNC, you may wonder? I will be providing science support in federal forest restoration efforts throughout Central Oregon, continuing to support Forest Collaboratives, and helping to bridge the gaps to increase the pace, scale and quality of restoration projects across property boundaries. I seek to support and promote science-based, landscape-scale restoration activities, increasing prescribed fire capacity via training exchanges (TREX) and helping to strike a balance between severe-wildfire risk mitigation, wildlife conservation, smoke impacts and forest health.

As TNC and OSU have been strong partners in the past, I look forward to strengthening this collaboration and supporting OSU Extension efforts for the mutual goal of conserving our forest resources for future generations of humans and wildlife alike.

I hope to see you amongst the trees someday and wish the best for you and the forestlands you work with.

Sincerely,

Thomas Stokely | Forest Ecologist with The Nature Conservancy | thomas.stokely@tnc.org