RECOVERING FROM EXTREME EVENTS

Effects of Disturbance

Restoration after Insect Epidemics

Salvage and Silviculture

Recovery after Extreme Weather

Prevention and Recovery with NRCS

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Forestland Taxes

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**ON THE COVER:**

Natural regeneration along a stream after a fire in central Oregon. Many tree and shrub species in the Pacific Northwest are adapted to disturbance. For example, some tree and shrub species, including alder (shown here on the right), can sprout after wildfire and windstorms. Photo courtesy: Jessica Halofsky

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In this world of ours the central theme is probably to strive for a sense of stability while meeting our needs. However, such a state is often hard to achieve due to disruptions. This happens often enough that we are prepared to some degree, such as having emergency rooms, fire trucks, EMT’s, Coast Guard rescue services, the Red Cross, police, alert health departments and so on.

Natural disaster ranks high on the threat list in terms of property damage and human suffering. Its occurrence is often difficult to predict, yet happens regularly, such as earthquakes, tsunamis, flooding and fire.

In western North America, wildfire has been a part of the landscape maybe forever and our forests and grasslands have been shaped by it. Early settlement came with the notion that the norm is to use the land versus just living off of the land. In that scenario, fire is bad and needs to be controlled. Now, when wildfires occur, how do we cope?

The wildfires in eastern Washington in 2015 were very destructive. Many of those affected had no idea how the forest industry works, and one bright spot was that local mills stepped forward to ease the pain by helping timber owners with salvage harvests. This resulted in help with harvest permits, and in some cases combining adjacent properties into a single logging operation to reduce move-in costs.

To deal with soil erosion the Natural Resources Conservation Service (NRCS) asked for about $6,000,000 in cost share money for erosion control in lost pasture and riparian areas. No tree or shrub seedlings were available for summer 2016 planting because nursery stocks were already committed. The Washington State Conservation Commission has allotted several million dollars toward disaster response. Other agencies, such as the Washington Department of Natural Resources (DNR), may also have matching funds available.

Reforestation of these burned forests will take years. Lack of landowner knowledge is one problem. But lack of nursery bed space and the two years it takes to grow a seedling is a bigger deterrent to prompt reforestation via planting. Also associated with a planting program is lack of adequate seed for nursery use. Not all seed is well-adapted to these planting sites. The wisest choice is local seed, which may not be available. Legally, harvested areas have a five-year window for reforestation in Washington.

The national Firewise program is administered by the DNR and can advise individuals or groups on how to protect their property, including structures. For example, clear debris and firewood away from buildings, use non-flammable roofing, have an evacuation plan, post emergency phone numbers by your phone, clean your gutters, thin stands of trees and burn the slash in the winter, and prune trees to prevent a fire from climbing into the tree crowns. Call 800-562-6010 for Firewise information. For tips on how to plant a tree see: file.dnr.wa.gov/publications/frc_webster_plantingforestseedlings.pdf

Grazing in the burned areas may be difficult for a year or so. However, grass seed companies are promoting direct seeding for livestock food and for erosion control. Some feel that domestic and wild animal grazing/browsing should be encouraged as a long term practice because it reduces light fuels. Planning for the future may include reducing forest fuels by thinning or prescribed burning.

Thus the recovery continues with the cooperation of many agencies. Fire is required to maintain our inland forests as they were historically. Can we safely maintain that landscape?
I can’t personally speak of fire recovery. Thankfully, it has never happened to me. So instead, I will talk prevention. “An ounce of prevention is worth a pound of cure.” We need a plan to recover. That should be the goal—a plan of action now so we can efficiently recover later.

Plan for the worst. Keep your home defendable. Walk in your forest and assume it will burn. How would you want it to look on the day you have to evacuate? Is the dry, dead stuff cleaned up, or can you barely even walk through because the trees are so close together? Educate yourself and practice sound forest management on your land. Take your Extension office’s fuel reduction, thinning and pruning classes.

With all of the red tape and litigation over the decision to manage or not to manage the National Forests there is delay. While we, as humans, argue about what to do, Mother Nature is planning to move ahead with her management plan, “It’s too thick—time to burn.” She can’t wait around for us to unanimously agree. It is not a matter of if there will be a fire, it is a matter of when. So prepare your land. When the National Forest burns in your area, will your property be ready? Will it be an understory burn on your land or a complete loss of all timber? Will your house at least be defendable?

For me, it would be very sad to see my forest burn and very sobering to potentially lose my home or animals, but I am confident that the forest itself will be OK afterward—it will recover. Nature can’t build you a new home, you would have to do that, but nature can rebuild a forest, providing we are gentle with it as it recovers. Erosion and soil compaction could be a real issue if you go in too “heavy” after a burn. As sad as it would be, recovering from a fire would offer the opportunity to replant for diversity with some trees resistant to blister rust, beetles and root rot.

As a community, after a big burn, we would recover the way we always recover—we would use manpower and science, we would do what we could, and then deal with the look of the forest while it recovers. I will be with the Idaho Master Forest Stewards program next month studying some of the areas in Idaho that burned last summer. Our goal is to learn more about the recovery and view it firsthand—it should be interesting. But I already know nature has a hard time recovering when we as humans both suppress fires and allow the forest to get too thick. When that happens the mature trees die too, and this makes recovery and reseeding much more difficult and time consuming for us and for nature. The best way to recover from an extreme event is to have been prepared BEFORE it happened. Start thinning your threat!
Preparing for Fire: A Road System is Important

Fortunately, I have not had a catastrophic fire event on my forestland so I cannot speak from personal experience about “recovering from an extreme fire event”. But when I read about woodland owner property damage from extensive fires in the western United States during years 2014 and 2015 it gives me pause. I cannot imagine the toll from a large fire consuming a woodland home, both financially and emotionally, on a family. Decades of memories of a place cannot be easily replaced.

What can we learn from recent devastating woodland fires? There are many factors a woodland owner may consider and act upon to lessen the effect of fire on their property. An adequate road system is a critical factor and at the top of my list. A maintained and clear road system serves a dual purpose. It helps the woodland owner drive to a management unit and do the day’s work. The road allows trucks and other heavy equipment to enter and exit your property efficiently. But, equally important, a road system allows professional firefighters to enter your property, proceed to the trouble spot, and extinguish a fire. Time is of the essence to put a small fire out before it becomes a big fire. The road system can be part of a strategy to put out the fire. The road is a natural boundary of dirt and rock which can block a fire. Professional firefighters can choose a backfire strategy to remove fuel load near a road, and this may block the oncoming principle fire path.

Fires don’t stop at property boundaries, so it is important to communicate with all neighbors (small woodland, industrial, state, federal and county owners) and the general public. What type of road systems do your neighbors have? Can all roads in your community be leveraged? Can signage near roads be used to educate citizens about safe activities during fire season?

Some members of our society decry the value of road systems on forestland. Recent legal challenges have focused on forest roads being detrimental to water quality due to potential sedimentation in streams. Such claims ignore the strict Forest Practice Laws that protect water quality and therefore are without merit. Today’s forest roads are designed to protect water quality. The principle watershed serving Portland, Oregon touts efforts to decommission roads within the watershed. As always balance between tradeoffs is necessary. But we must keep in mind that removing roads within a watershed, or any forestland property, may put these lands at greater risk of major fire losses and cause significant complications when trying to keep fires small.

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AUGUST

✓ In stands susceptible to engraver beetles, schedule cutting of trees over three inches in diameter after August 1 and before January 1 to prevent population build-up in fresh slash.

✓ Forestland is popular for hunting. Look into options for permitting and security.

✓ Maintain your fire prevention diligence until fire season is over in your area. Do you know what your fire danger rating is?

✓ While water levels are low, complete your instream repairs and improvements. Find out if a permit is required. Consider installing a guzzler or cistern for wildlife. Clear out and reestablish overgrown springs.

✓ If you’re planning a selection harvest, take the time to paint either the leave trees or the take trees. Or, with a reliable logger, develop clear logger-select guidelines and monitor the work as you go.

SEPTEMBER

✓ Invite a logger, forester or firefighter to survey and assess your roads for access, repair and maintenance needs. Take a look at the entire haul route(s) and assure that you have road use permits in place.

✓ Cruise the timber you plan to harvest or have a professional forester do it. Having a good estimate of volume and value helps you market the logs.

✓ While you’re cruising, take some core samples to see how your trees are growing. Do a few calculations to assure yourself that your efforts are paying off with accumulated growth, improved vigor and overall good forest health.

✓ Students are back in school and it’s a good time to host or participate in a forest tour. Help our future forestland owners learn about natural resources on site. It will be memorable!

✓ Check your management plan for next year. Discuss upcoming project opportunities with a consultant or agency representative.

OCTOBER

✓ Begin your road maintenance and improvement projects after some moisture has reduced the potential for dust and the road surface is workable.

✓ The end of fire season is often a good time for burning slash or prescribed burning. Use of fire requires planning and usually a permit or notification. The burn “window” is sometimes small, so be well-prepared to begin when conditions are right.

✓ Develop your tree planting contract or agreement and hire an experienced contractor. Get it done right the first time!

✓ When you’re pleased with your project results, give your forester, logger, agency representative or hired hand kudos for a job well done.

✓ Find out when and where to apply for cost-share incentives for next year’s projects.
When a wildfire burns across private forestland the losses are often greater, and felt more deeply, than those on public land. Family forestland owners who actively manage their land are passionate about every acre and every ounce of sweat equity they’ve invested in caring for their resources and improvements. Much of that work is intended to reduce fuel loads and the negative effects of potential wildfire. But the behavior and intensity of wildfire is difficult to predict before the event; sometimes even the best efforts go unrewarded.

On August 10, 2015, lightning ignited several fires in the Baker City, Oregon area. South of town, two of those fires eventually burned together to form the Cornet-Windy Ridge fire, a particularly devastating wildfire across 103,887 acres of public and private forest and rangeland. One of the private ownerships caught in the middle of the two fires is owned by Eileen and Brent Gyllenberg. It’s difficult to imagine what the couple went through when the fire was threatening and burning their property. But Eileen and Jana Peterson from Oregon Department of Forestry shared some important “after the fire” pointers with me at the recent OSWA annual meeting.

“The urgent tasks come first—like caring for livestock,” said Eileen, who has 100 head of bison. It was necessary to buy more hay, and the soil was too hot to reestablish fence corners so they had to do some creative “propping” at first. Clearing the access roads and cleaning up debris, soot and blowdown came next.

When it was time to evaluate the damage to the forest stands, Eileen found that the fire burned less intensely as it burned into the managed property. But most of the burned area required replanting, and the sooner the better because the soil was bare and there was some standing shade provided by the larger trees. In the spring, weeds and certain plants like lupine will take advantage of the growing conditions. Eileen advises, “Look forward to the future of your forest and plan for its regrowth. Take advantage of opportunities like establishing aspen and using genetically improved seedlings.”

In the event that your property is involved in a wildfire, Eileen and Jana recommend calling the local agencies afterwards, like Natural Resources Conservation Service, Farm Service Agency, Soil and Water Conservation Districts and your department of forestry. Make sure you are on their lists for helpful information and potential funding for recovery. Prepare for the worst case scenario before the fire, and make sure you are as resilient as your forest.

Editor’s Note: Over the last 40 years I have learned to admire private forestland owners who contribute so much to each other and to the public because of their passion for good forest stewardship. One of the volunteers I had the good fortune to collaborate with since becoming editor of this magazine is Dave Bateman. He wrote the Down on the Tree Farm column for eight years, encouraged and supported by a quarterly gathering of Oregon Small Woodlands Association (OSWA) members over breakfast. Dave’s columns were packed full of useful information and recommendations for timely treatments and tasks. He has been an active OSWA member at the county and state levels for many years, and he and his wife Karen were recognized as Linn County Tree Farmers of the Year in 2015. Dave was also well known in Washington County, Oregon where he helped to manage his family’s tree farm along Gales Creek. Dave passed away April 12th on his 66th birthday. My heart goes out to his family and friends.
The last thing a woodland owner wants to see is their hard work going up in smoke in a wildfire, or decimated by an insect or disease outbreak. These are relatively rare events, but when they do occur they often cause economic losses and alter ecological pathways in forest ecosystems for decades. However, these rare events, generally termed disturbances, are part of the ecological history of most forest ecosystems, influencing vegetation age and structure, plant species composition, productivity, carbon storage, water yield, nutrient retention, and wildlife habitat.

Disturbance events can have significant positive effects and create conditions that sustain many valued forest characteristics. For example, they produce snags and downed wood for bats, birds, and mammals to use for dens, perches, and hiding cover. They kill trees and create openings where grasses, forbs, and shrubs resprout and provide forage for ungulates such as deer and elk. In dry conifer forests, ponderosa pine and western larch can flourish because fires remove competition.

Most ecosystems are adapted to periodic disturbance and have mechanisms for recovery. For example, soils, if scorched by fire, can release nutrients, allowing for quick vegetation recovery. Some tree species, such as Rocky Mountain lodgepole pine, have serotinous cones that only release seed after being exposed to high heat from fire. Other types of trees and shrubs are able to sprout after fire or windstorms. In addition, many of the common conifers in the Pacific Northwest, including Douglas-fir, ponderosa pine, and western larch, have thick bark that can withstand low- to moderate-intensity fires. Trees that survive fires are then able to provide seed for regeneration in burned areas.

Climate, and weather on a shorter time scale, influence the timing, frequency and magnitude of disturbances and also recovery from distur-

DISTURBANCE

Disturbance is a temporary variation in average, long-term environmental conditions that causes a pronounced change in an ecosystem. Ecological disturbances include fires, floods, windstorms, and insect outbreaks, as well as human-caused disturbances, such as forest harvest and introduction of non-native plant and animal species. Natural disturbances are influenced mainly by climate (long-term), weather (short-term) and characteristics of local vegetation and topography. Disturbances cause immediate effects on ecosystems and can alter the trajectory of vegetation composition and structure. Because of its effects on plant and animal populations, disturbance can alter forest ecosystems for decades to centuries.
bance in any particular location. For example, a one-year drought may in itself not have significant direct effects on a forest, but it can reduce the resistance of trees to insects, and can desiccate living and dead vegetation sufficiently to increase fire hazard. Drought after disturbance events can also limit regeneration and prolong the recovery process. The recent proliferation of mountain pine beetles in lodgepole pine forests in western North America is a good example of how a warmer climate can propagate widespread disturbance. Mountain pine beetles have caused extensive mortality in 50 million acres of forests in the western United States and British Columbia over the last two decades, largely as a consequence of increasing temperatures and drought in mostly older, low-vigor forests.

Interacting disturbances and other stressors have the biggest effects on ecosystem responses, simultaneously altering species composition, structure, and function. Termed stress complexes, these interactions are a normal component of forest ecosystems. However, altering one particular factor can potentially exacerbate the effects of other stressors, leading to a rapid and possibly long-lasting change in forest ecosystems. For example, the effects of disturbance across large geographic areas are especially pronounced where forest regeneration is minimal or delayed, potentially from drought or invasive species outcompeting native species, leading to a potential change in dominant vegetation.

The effects of and recovery from disturbances in forest ecosystems should be considered in the broader context of past disturbances and stressors that have been occurring for millennia, as well as more recent human-caused changes. Some factors have increased over the past century, such as non-native and invasive plant and animal species. Other factors have decreased, such as the frequency of low-intensity wildfire in dry forests. Logging has removed about 90 percent of the original forest in the western United States, converted most landscapes to younger forests distributed in mosaics of different age classes, and altered the distribution, abundance, and genetic diversity of species in some forests. Agriculture, suburban and exurban communities, and other land uses have reduced the connectivity of forests and added a new socioeconomic complexity to resource management.

Some of these human-caused changes in our forests exacerbate the effects of, and slow the recovery from, disturbance. Fire suppression in forests that historically had frequent, low-severity fire has resulted in fuel buildup, often resulting in higher severity fires and longer periods of forest recovery. Non-native species take advantage of disturbance events to resprout and can inhibit or slow regeneration of native species. Reduced connectivity of forests can make it more difficult for some wildlife species to respond to disturbance events by limiting their ability to move through the landscape to find suitable habitat after disturbance.

The expansion of human communities and infrastructure into forested regions, typically called the wildland-urban interface (WUI), has also complicated the issue of managing forest disturbance. Many communities are now located in areas where fire has been suppressed for several decades and residents assume that local agencies will continue to protect their property in the future. Efforts to protect homes in the WUI account for much of the annual cost of firefighting in the United States. Fuel treatments are highly effective in reducing fire hazard, but are expensive in the WUI and are sometimes unpopular among local residents (especially removal of small trees that alters aesthetics and prescribed burning that creates smoke). However, there are many examples of collaborative projects between agencies and communities that have reduced fuels and saved properties from wildfire.

Forest managers, whether on public or private land, spend a significant

---Continued on next page---
amount of time assessing the risk of disturbances and ways to cope with them. Most federal lands have fire management plans that describe current fuel conditions, potential for fire occurrence, likely effects of wildfire, fire suppression strategies, and post-fire activities designed to reduce secondary damage such as erosion. Similarly, plans that assess the management of insects and non-native plants must assess the risk of their occurrence as the basis for developing appropriate responses. Large private landowners focused on timber production may also have such plans, but family forestland owners rarely have them.

In some cases, the effectiveness of pre-disturbance and post-disturbance actions may be limited. For example, many non-native species are so well-established that it is not feasible to remove them from a particular location: prevention is usually the best approach. Following large, intense wildfires, it may be impractical and expensive to install erosion control across a broad, mountainous landscape with minimal access. Active management in some forested regions (wilderness, most national parks, riparian areas, and lands with endangered species) may be forbidden or so difficult to accomplish that it is not practical, thus precluding mitigation of known risks.

A warming climate is a new factor that will increasingly affect forest ecosystems. The most rapidly visible and significant short-term effects will be caused by disturbance, often occurring with increased frequency and severity. As the climate continues to change, we expect increased disturbance to be facilitated by more frequent extreme weather events, including prolonged droughts. Indirect effects—wildfire, insect and pathogen outbreaks, and invasive species—may amplify these changes. The type and magnitude of disturbances will differ regionally and will pose significant challenges for managers to mitigate damage to resource values.

A warmer climate may cause some critical thresholds in ecosystem structure and function to be exceeded. This may already be occurring in some locations. For example, in parts of northern New Mexico, there has been die-off of pinyon pine on one million acres during the past decade, the result of extended drought and in some cases pinyon ips beetles. It is unclear if pinyon pine will regenerate in these areas. During the past 20 years, in southern Alaska, spruce beetle and wildfire have caused widespread mortality in three million acres of forest dominated by white spruce and black spruce. In some of these areas, only hardwoods are regenerating. A rapid change in dominant vegetation suggests that a threshold has been crossed, at least temporarily, and that new ecological conditions may be difficult to reverse in a warmer climate.

Forest ecosystems in western North America will continue to change as a result of disturbance, sometimes slowly in response to past human activities such as logging, and sometimes quickly in response to weather extremes. In most cases, it will be advisable to develop strategies that allow us to live with increasing disturbance and stress in forests, especially as the climate continues to warm. For example, it will be increasingly important to keep forests “healthy” through density management and other practices that encourage high vigor. Reducing hazardous fuels, especially in the WUI,
Large wildfires, such as the 2014 Carlton Complex Fire in Washington (250,000+ acres), have occurred throughout western North America during the past decade. These disturbances have a significant effect on landscape pattern and forest structure, and may become more common in a warmer climate, especially in forests with heavy fuel accumulations.

Large wildfires will continue to occur, particularly if hot, dry summers lengthen the fire season. Fuel treatment placement and effectiveness can mitigate the destructive role of fire, although fuel treatments have limitations. They will not fireproof a forest. Fuel includes all live and dead vegetation, and given the right conditions (wind, drought, high temperatures), fires can burn through fuel treatments in undesirable ways. Forests continue to grow and develop over time, thus maintenance of low-fuel conditions is a necessary component of fuels management. Even extensive treatments may not reduce the amount of area burned, but will generally reduce fire intensity, thus providing suppression opportunities and reducing damage to the forest overstory. The challenge is to identify the best places (near homes and in the landscape), treatment methods and maintenance schedules—then, when a wildfire does occur, the fuel treatment performs as we expect, contributing to the resilience of our forests.

The good news is that active management and planning in anticipation of changing conditions can reduce risk and the severity of short-term and long-term hazards. Foresters have been dealing with disturbances and other “surprises” for decades. Based on a strong scientific foundation compiled on the effects of forest disturbance, we should be able to successfully address many of our future challenges.

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Successful Restoration After an Insect Epidemic

As we all know, insect outbreaks are common in the Pacific Northwest. Defoliating critters such as western spruce budworm, Douglas-fir tussock moth or pine butterfly, as well as bark beetles like mountain pine beetle, raise their heads frequently (e.g., mountain pine beetle) or occasionally (e.g., pine butterfly) across the landscape. A good overview of insect outbreaks, including influencing causes, trends, impacts, how to minimize losses, stand treatments for improving tree vigor to lower risk, and sources of assistance are provided in the spring 2016 Northwest Woodlands article by Glenn Kohler. This article will take the next step and focus on strategies for successful restoration following an outbreak.

To start with, how do we define an insect epidemic? An insect epidemic pertains to populations of insects that build up, often rapidly, to unusually and generally injuriously high levels: a synonym is outbreak. Many insect and other animal populations cycle (periodically or irregularly) between endemic (normal or background population) and epidemic levels. One important principle is that insect epidemics can either kill many trees outright (such as bark beetles), cause visible defoliation with a little, some, or a lot of mortality (defoliators like western spruce budworm) or cause little impact other than some growth loss (larch casebearer). So the proof is in the pudding. That is, not all outbreaks have similar outcomes; it depends on things like which insect is causing the damage (each insect has a typical epidemic pattern of damage), stand conditions and weather during and after the outbreak.

Another question is, what is restoration? Restoration from an ecological perspective refers to the process of returning forests to their original structure and species composition. Basically, it’s returning the forest to a condition where it is healthy, vigorous and functioning properly ecologically. Once these criteria are met your forest will be in a condition to meet your ownership objectives. Restoration can involve a number of activities, such as salvage and sanitation, planting and tree thinning to manage density, species composition and stand structure. In addition, restoration can involve purposefully wounding and killing trees to create wildlife habitat. Are there secrets to success? Probably not, but we’ll explore a few ideas that might help get you started in the right direction.

Know the bug!

The damage it causes could be bad, but find out if it looks worse than it is. Cultivate good relationships with your local state department of forestry and Extension foresters who can provide valuable resources, information and advice. If you don’t have experience with a particular insect, then go to those who do. Get to know entomology specialists. Your state forestry department has specialists that work with private landowners, and the U.S. Forest Service has specialists working in Forest Health Protection programs. This effort can help you understand impact potentials, identification, biology, and behavior of the insect doing the damage. You can find out if the outbreak is increasing or in decline and get an idea of projected duration and potential impacts to trees and stands. Then, check out what is happening adjacent to your property and in the region.

Walk your forest (with a forester if possible) to get an assessment of what is happening and ideas for restoration. Also, build relationships with your neighbors. In the aftermath of an outbreak, teaming up with your neighbors may come in handy as you try to negotiate salvage operations. You may benefit from using the same logger, addressing access issues, or completing tree planting and thinning.

Different pests have different tree and stand impacts and management strategies for restoration. Although we can’t predict exactly what is going to happen, we know from research and observation what to expect generally in terms of damage, outbreak duration and host species/tree size that will be affected for many of our forest insect pests. Assessments should be conducted as soon as the outbreak begins and as it evolves. Collect aerial photographs, topographic maps, soils maps and other information to help delineate forest stands and stand types affected by the outbreak. If you’re considering salvage of dead and dying trees, determine access, slope, possible...
markets for the salvage material and distance to those markets. A cruise or inventory will help determine if a salvage is feasible, providing tree sizes, species and volume. The more you know the better informed your decisions will be!

Consider restoration options based on your ownership objectives

Your short- and long-term ownership goals and objectives should guide your restoration actions. If you have a management plan, check out your goals, objectives and any inventory information and management recommendations by forest type. If you don’t have a management plan, consider having one completed prior to taking action if there is time. If time is of the essence, take some time to think about your ownership goals and objectives before taking action.

What’s unique about restoration after a defoliator outbreak?

Defoliators can be caterpillars feeding on needles, like Douglas-fir tussock moth, western spruce budworm or pine butterfly, but it can also be those insects that suck juices from the needles or even bark, such as aphids, adelgids and scale insects. This action causes tree decline, early needle drop, top dieback, branch flagging and sometimes tree mortality. The duration of defoliator outbreaks can vary: for example, western spruce budworm epidemics can persist for many years (10 to 20), but pine butterfly or Douglas-fir tussock moth outbreaks are typically fairly short, about three years. If and when you begin restoration activities depends on the insect causing the damage and the severity of the damage (see Table 1). Don’t overreact. In some cases, restoration will be on hold during the outbreak or even shortly after. Defoliation can occur resulting in little or no mortality. In Oregon over the past decade, no significant mortality has happened following outbreaks by the pine butterfly on the Malheur National Forest, oak looper in the Willamette Valley, and western tent caterpillar in the lower Columbia River region.

Longer-term restoration might involve spacing trees out to improve vigor, or shifting species, if possible, to reduce susceptible hosts in the stand. In other cases, significant mortality of larger trees has happened and restoration activities, such as salvage, are needed to recover economic losses and restore the forest to a healthy state. Restoration in this case could also include follow-up density management work, shifts to fewer host trees, and thinning from below to create a more even-aged stand structure. Western spruce budworm larvae disperse by “raining down” from the overstory onto the understory creating higher populations on these smaller trees and greater damage. Thinning from below in mixed conifer forests reduces damage from insects like budworm by removing suppressed and intermediate trees.

Defoliation can weaken trees and bark beetles can take advantage, attacking and killing low vigor trees during and after a defoliator outbreak. Weather conditions before, during and after a defoliator outbreak

—Continued on next page—
will either promote bark beetle-related mortality (drought) or reduce the risk (normal or above normal precipitation). The health and vigor of trees prior to an outbreak also has a strong influence on tree and stand recovery following the outbreak (see Table 1).

Management practices you can employ prior to an outbreak that will help reduce the risk of damage on your forest when outbreaks occur were described in Glenn Kohler’s article in the spring issue.

**What’s unique about restoration following a bark beetle outbreak?**

One of the big differences between defoliator and bark beetle impacts is that defoliation does not guarantee the tree or trees will die. In contrast, when a tree is attacked by bark beetles, most of the time the tree will die. Generally, the tree will be green the year it is attacked and will turn yellow, then brown and finally red in the late spring and early summer of the following year. Bark beetles attack and colonize the main bole of the tree, with larvae feeding in the cambium/phloem region between the bark and sapwood. This feeding activity essentially girdles the tree. Blue stain fungi are also introduced, which clog water conduction in the tree. The combination of girdling and blue stain is generally thought to cause tree death, although recent evidence indicates the blue stain fungus is also an important food source for bark beetles.

The decision to salvage or not is a little easier with bark beetles. Once you see tree crowns fading and turning brown/red the beetles are either gone or close to being gone. For pines, blue stain in the sapwood causes a deduction in grade at the mill and a loss of value. Trees turn blue soon after they are attacked. For other species bluing is not an issue; you have a year or so to salvage after tree death. Prompt salvage is essential.

Your options will depend on things like the severity of the outbreak, the bark beetle causing the damage, host size and species, stand composition, stand structure, duration since trees have been killed, markets, slope steepness, and hauling cost (see Table 2).

The other point here is that, in many cases, it is better to wait a year or two after the outbreak to let the beetle populations decline before salvaging. This is particularly true if you are converting the stand from conifer to ponderosa pine.

---

**Table 1. Selected defoliating insects capable of developing outbreak populations and what to consider when making plans for management and restoration.**

<table>
<thead>
<tr>
<th>Defoliators</th>
<th>Primary host(s)</th>
<th>DBH range</th>
<th>Outbreak duration</th>
<th>Outbreak cycle</th>
<th>High risk stands</th>
<th>Restoration action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western spruce budworm</td>
<td>Doug-fir, grand &amp; white fir</td>
<td>All</td>
<td>Long, 10-20 yrs in some cases</td>
<td>10-20 yrs</td>
<td>High true fir component, multi-age structure</td>
<td>After outbreak is over, salvage dying &amp; girdled trees and convert to higher component of seral species. Watch for bark beetle-attacked trees and consider sanitation/salvage.</td>
</tr>
<tr>
<td>Douglas-fir tussock moth</td>
<td>Doug-fir, grand &amp; white fir</td>
<td>All</td>
<td>Short, 3-4 yrs</td>
<td>10-20 yrs</td>
<td>High true fir component, multi-age structure, dry sites</td>
<td>Same as western spruce budworm, Convert drier sites to ponderosa pine.</td>
</tr>
<tr>
<td>Larch casebearer</td>
<td>Western larch</td>
<td>All</td>
<td>Few years</td>
<td>?</td>
<td>?</td>
<td>Don’t overreact; often predators &amp; parasitoids control population.</td>
</tr>
<tr>
<td>Scale insects</td>
<td>All species</td>
<td>All</td>
<td>Varies</td>
<td>Sporadic</td>
<td>Dry sites</td>
<td>Remove weak &amp; heavily infected trees.</td>
</tr>
<tr>
<td>Balsam woolly adelgid</td>
<td>True firs, esp. sub-alpine, Pacific silver &amp; grand</td>
<td>All</td>
<td>Long, ongoing at higher elevations in OR &amp; WA</td>
<td>Introduced pest; continuing</td>
<td>High elevation with high proportion of hosts</td>
<td>In stands dominated by hosts, convert to non-host species Otherwise remove damaged &amp; high-risk host trees.</td>
</tr>
<tr>
<td>Pine butterfly</td>
<td>Ponderosa pine</td>
<td>All</td>
<td>Short, 3-4 yrs</td>
<td>Sporadic</td>
<td>Pure ponderosa pine</td>
<td>After outbreak is over, watch for bark beetle-attacked trees and consider sanitation/salvage.</td>
</tr>
</tbody>
</table>

---

Prompt salvage of bark beetle- or flatheaded fir borer-killed trees during epidemics is essential to capture timber value.
cases if not most, proper density management to keep forests within the upper and lower density management guidelines will provide for high tree and stand vigor and, while it doesn’t beetle-proof your stand, it will lower its susceptibility and risk.

Can you salvage some value?

If your stands in the outbreak area have damaged merchantable timber, then salvaging quickly, while it still has value, is important. With insect outbreaks, like wildfire, you can’t time your sale of wood on good markets. You have to sell into the market and get what you can at that time. You need to decide the benefits of salvage, which can include capturing potential value and restoration of your forest to maintain its potential. Consider hiring a consultant to mark the timber and supervise the logging if you are unsure how to manage a salvage operation. Make sure you have a good logging contract too. Here are some considerations for salvaging timber that has been killed or severely damaged during an outbreak:

- Bark beetles kill trees quickly. They attack during the spring and summer and the tree stays green until the following spring/early summer. Wide scale salvage of infested trees has the potential to help reduce beetle populations in that area. If you can identify attacked trees in the year they were attacked, you can remove infested trees and maximize the value of that tree at the mill. For pines this is more difficult because blue stain fungi affect the sapwood as soon as they attack the tree. Most mills will reduce their prices for blue pine logs because of the grade reduction they have to absorb in the lumber.

- Generally, you will have only a year or so to salvage insect-killed trees; the larger trees can be left longer than smaller trees. Once you start seeing pouch fungus conks on the outside of the bark, which is a sap rot that beetles also carry with them, then defect deductions will increase and in some cases render the tree valuable for pulp/chips only. Logs need to be at least 33 to 50 percent sound/usable wood for pulp.

- Sanitation/salvage is a technique that removes trees killed by insects as well as infested and/or weakened trees. Sanitation is planned to remove pests from the forest and improve stand health, whereas salvage is the capture of value and dollars. For example, sanitation would involve harvesting trees while the bark beetles are still in the trees so as to remove them from the site. Salvage is harvesting dead trees quickly to capture value, but in an operational sense the two objectives are often combined. Dwarf mistletoe may also be managed at the time of salvage.

- For insects that defoliate trees, such as western spruce budworm or Douglas-fir tussock moth, the best strategy is to wait until the outbreak is over to see which trees survived the outbreak and which trees were either killed or weakened and need to be removed. Trees weakened by defoliation are susceptible to bark beetles for several years following an outbreak, so be aware of this and prepare for a second entry if needed to remove trees killed by beetles. Drought following a defoliator outbreak exacerbates this situation.

- Restoration can start with a sanitation/salvage operation, but should be followed by other management practices to restore the stand to a healthy state—one that will be less at risk from future insect outbreaks and wildfire. This can include a number of

<table>
<thead>
<tr>
<th>Bark beetles</th>
<th>Primary host(s)</th>
<th>DBH range</th>
<th>Outbreak duration</th>
<th>Outbreak triggers</th>
<th>Higher risk stands</th>
<th>Management options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western pine beetle</td>
<td>Ponderosa pine</td>
<td>12” +</td>
<td>A few yrs to several yrs</td>
<td>Drought, overstocking</td>
<td>Declining larger trees; overstocking</td>
<td>Salvage dead, drying &amp; high risk trees in older stands. In second growth, salvage dead &amp; drying trees; space the rest between upper &amp; lower guidelines.</td>
</tr>
<tr>
<td>Mountain pine beetle</td>
<td>Lodgepole and ponderosa pines</td>
<td>7-8”+</td>
<td>Generally several yrs</td>
<td>Older-aged, overstocked lodgepole pine; drought aggravates</td>
<td>Large areas of overstocked and older lodgepole pine; ponderosa pine in close proximity to lodgepole epidemic</td>
<td>Older lodgepole; salvage &amp; convert to younger age class; thin early as appropriate. Ponderosa pine; salvage mortality pockets &amp; space to keep density between upper &amp; lower guidelines.</td>
</tr>
<tr>
<td>Pine engraver (Ips species)</td>
<td>Ponderosa and lodgepole pines</td>
<td>Tops &amp; smaller trees over 3” dia.</td>
<td>Short, usually one or two yrs</td>
<td>Slash generated from January to June; drought</td>
<td>Stands with slash &amp; adjacent overstocked stands</td>
<td>Manage slash &amp; thin young stands</td>
</tr>
<tr>
<td>Douglas-fir beetle</td>
<td>Doug-fir</td>
<td>8-10”+</td>
<td>1-2 yrs to longer</td>
<td>Blowdown, drought, overstocking, defoliation</td>
<td>Overstocked stands on dry sites</td>
<td>Remove infested blowdown within one year; keep density between upper &amp; lower guidelines.</td>
</tr>
<tr>
<td>Fir engraver</td>
<td>True firs, esp. grand, white, noble &amp; red</td>
<td>All</td>
<td>1-2 yrs to longer</td>
<td>Drought, defoliation, overstocking, poor sites</td>
<td>Overstocked stands on dry sites</td>
<td>Salvage; convert to seral species on drier sites</td>
</tr>
<tr>
<td>Spruce beetle</td>
<td>Engelmann spruce</td>
<td>10-12”+</td>
<td>Several yrs</td>
<td>Blowdown, drought, overstocking</td>
<td>Overstocked stands along riparian areas near blowdown</td>
<td>Remove blowdown within one year</td>
</tr>
<tr>
<td>Flatheaded fir borer</td>
<td>Doug-fir</td>
<td>All</td>
<td>1-2 yrs to more</td>
<td>Drought, poor soils, overstocking</td>
<td>Overstocked stands on dry sites</td>
<td>Salvage; convert stands on drouthly sites to pine</td>
</tr>
</tbody>
</table>

**Table 2. Selected bark beetles capable of developing outbreak populations and what to consider when making plans for restoration.**

**SOURCE:** PAUL OESTER AND DAVE SHAW

—Continued on page 31—
Salvage and Silviculture

By CHRIS SCHNEPF

The Pacific Northwest had many fires last year. For some, forest fires conjure images of trees completely vaporized by fire. But crown fires often move through a forest fairly rapidly, consuming tree needles and fine branches and leaving charred snags. Chopping into those trees often reveals sound wood.

Salvage sales can be set up in response to anything that kills trees, including insects, disease, fire, or storms. For example, many forest owners in the Idaho Panhandle are salvaging trees downed in wind storms in November and December of 2015. Salvage sales have different criteria depending on what killed the trees, the time of year, and markets available for what might be salvaged. Here we focus primarily on salvaging trees killed by wildfire.

Beware of falling trees!

Trees killed in a fire may be unstable. As you assess your property, be aware of this hazard and wear a hard hat. Felling trees near frequently used trails or roads on your property reduces this hazard. If you drop trees for safety purposes, felling them parallel to the slope will help catch eroded sediment generated by the fire and keep it from entering streams.

Is the wood good?

First, check with your mills to see how much they are paying for what kinds of burn-salvaged timber—it may or may not be worth hauling to the mill. The woody parts of the tree that do not make it into boards are typically sold by the mill for paper chips or other residuals. If the char is limited to the bark, the price reduction may be small, since that char is removed with the bark. But if the fire gets into the wood, the chips may not be sellable for paper. Carefully manufacturing logs to leave out pieces with burned wood can make logs more useable.

Salvage sooner rather than later

The wood quality of dead trees degrades over time. Generally, the sooner you can harvest fire-killed trees, the better. Landowners often ask how much time they have to salvage trees before they “turn blue.” Blue stain is a fungus that turns wood blue to grey. While blue stain does not degrade wood quality, most mills deduct for the discoloration in pines. Blue stain is commonly introduced by bark beetles, which feed in the phloem—between the bark and the wood of the tree. Since burned trees were not killed by bark beetles, the wood may not be blue, especially if they burned late in the fire season, but eventually, the trees will attract wood boring insects, which may introduce blue stain.

Trees stressed, but not killed, by...
fire may attract bark beetles. Such trees may stain fairly quickly. The speed at which wood “blues” is variable, probably depending on moisture or other local environmental factors. To avoid price reductions for blue stain, get beetle-attacked trees to the mill as soon as possible.

Beyond blue stain, pouch fungus, another decay fungus brought in by bark beetles and wood borers, has more structural consequence because it decays the sapwood. To prevent decay from pouch fungus, try to salvage beetle-killed trees in less than two years. Removing trees killed by Douglas-fir beetle before May of the following year prevents beetles from emerging and killing additional trees.

In areas with extensive fires, the amount of burned timber may exceed the mills’ ability to process it. In these situations, mills may stop buying burned logs regardless of salvageability, making prompt salvage even more critical.

Is it dead yet?

In addition to trees clearly killed by fire, some trees are partially burned or stressed by fire, especially at fire edges and where the fire stayed on the ground surface. Whether a tree will die is always a judgement call, but different species are more likely to survive fire damage than others. We have an excellent Extension publication on post-fire responses at: uidaho.edu/extension/forestry/content/fire/ecology then click on “After the Burn: Assessing and Managing Your

---Continued on next page---
**Keeping biological legacies**

Just because you can take a tree to a mill doesn’t mean you should, depending on your objectives. Fire is a normal part of western forest ecosystems. Forest plants and trees have adapted to fire in many different ways. So have wildlife species. For example, black-backed woodpeckers specialize in burned-over forests. If wildlife is important to you, leave some charred snags, especially trees with defects in log quality, such as forks, crook, or sweep. These trees will provide wildlife and soil benefits for decades or longer while they are standing, after they fall, and as they decay into the ground. For more information, see “Managing Organic Debris for Forest Health” available at: cals.uidaho.edu/edComm/pdf/PNW/PNW0609.pdf.

**Reforestation**

Because of 100 years of fire exclusion, partial harvesting, and introduced diseases, many Inland Northwest family forests’ species composition has shifted from pines and larch to much heavier proportions of shade-tolerant species, such as Douglas-fir and grand fir. Post-fire there is an opportunity to restore species to the site that are ultimately more tolerant of drought, fire, insects and disease.

Many shrubs and other plants are highly adapted to disturbance by fire. For example, many of the first species to dominate a site after a fire (e.g., ceanothus, snowberry, alder) fix nitrogen, which fires often deplete. These plants can help stabilize slopes, restore nutrients and feed wildlife. But shrubs and grasses can also impede reforestation, especially on dry sites. Establish tree seedlings promptly to give them a head start. Order the seedlings you need as soon as possible. After big fires, the tree seedlings adapted to the burned locations sell out quickly.

**Weed invasion**

Many weed species take advantage of the bare soils created by a fire. Have logging equipment thoroughly cleaned before it comes to your property, to remove as much weed seed as possible, especially if the site the equipment came from was wet or muddy. Monitor the timber sale and associated access roads for weeds after the sale, and control new patches promptly.

Seeding roadsides with grasses and other plants reduces erosion, suppresses weeds and provides forage for livestock and big game. For more information, see a University of Idaho Extension publication titled “Grass Seeding Forest Roads, Skid Trails, and Landings in the Inland Northwest” (PNW628) available at: cals.uidaho.edu/edComm/pdf/PNW/PNW628.pdf. Note that grass is a very effective competitor for moisture, especially on drier sites. If establishing new tree seedlings is a primary objective, limit grass seeding to areas where significant soil erosion may be an issue.

**Wood is not the only value that can be salvaged from the fire**

Forestland owners who live in areas with extensive fires may see people coming to harvest edible wild mushrooms. Some species of morels come in abundantly during the first couple of years after a wildfire, especially with adequate moisture to support their growth. In Idaho, if you do not charge people to harvest on your land, you are generally not legally liable for accidents they might have. But if you want revenue, you should have some sort of written contract that clearly spells out legal liabilities and insurance requirements, just as you would for a timber sale.

Just like some deer and elk hunters, commercial mushroom hunters may not always know where property boundaries lie, especially where private and public forests commingle. If mushroom harvesters trespass on your land, contact your
county sheriff’s office. Your sheriff may have already made arrangements with interpreters to help them interact with commercial mushroom harvesters when English is not their primary language.

**Taxes**
If you have been keeping good records on your forest management, the damage you suffered may qualify as a “casualty loss.” For more information, check the National Timber Tax website at: timbertax.org. Type “fire” into the search engine.

**Assistance**
To help you plan and contract a salvage sale, it is wise to seek assistance from a professional forester, especially if you are making decisions about trees which may or may not be near death. If someone claiming to be a logger or forester knocks on your door, and seems to imply every tree with some brown needles will die shortly, ask for credentials and check with a reputable forester to assess the condition before cutting the trees.

Limited technical forestry assistance is available from state forestry offices. For more comprehensive assistance, consulting foresters offer timber inventory, timber sale administration, tree planting, and many other services for a fee. As your representative, the consultant’s success depends on keeping you satisfied by getting top prices for your logs, while meeting your land management goals. Make sure you confirm the consultant’s fee, call references, and check credentials before agreeing to the work.

**Conclusion**
Fire has always lived large in western forests’ ecology and management. It is heartbreaking to have trees killed by fire on your property, but our forests are relatively adapted to fire. With prompt attention, you can sometimes salvage significant value and put your forest back on track to meet your management objectives—sometimes on a better trajectory than the original one. ■

**CHRIS SCHNEPF** is an area Extension educator for University of Idaho Extension in Coeur d’Alene. He can be reached at 208-446-1680 or cschnepf@uidaho.edu.

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**THE ASSOCIATION OF CONSULTING FORESTERS**
Growing Trees and Forests:
An Extreme Sport in the IPNW

By STEVE McCONNELL

The Inland Pacific Northwest (IPNW) is home to millions of forested acres: awe-inspiring in their beauty, bedecked by snow-covered mountains and deep shadowy canyons. Home to streams that lead to rivers that host salmon that are icons for the entire Pacific Northwest, these forests also include diverse terrestrial habitats that range from high-desert sage to expansive wetlands that support iconic species, such as bighorn sheep and moose.

The IPNW has a complex geological history of volcanoes and glaciers that produced vast differences in a soil's ability to hold onto the all-too-sparse moisture. This correlates to vast differences in forest productivity from place-to-place. Winters can be cold, wet and long—or not! Trees, therefore, need to be able to carry on regardless of winter conditions. In the summer, and sometimes well into the fall, the IPNW country can be sun-baked, with no rainfall for a hundred days or more.

The forests in the IPNW comprise a complex jumble of slopes, aspects, soils, low rainfall and extreme temperatures where at least 14 different tree species contend for dominance in the free-for-all that results from so many niche combinations available (see Table 1). A change in aspect of as little as 15 degrees can change site suitability from supporting species like spruce, cedar or grand fir, to one on which only ponderosa pine and sagebrush will grow. A drop in elevation of only 50 or 100 feet can result in bone-dry, south-facing slopes, that will not even support ponderosa pine, providing habitat for western redcedar or black cottonwood growing along the sides of streams.

At lower elevations, and at the southern and western fringes of the IPNW that are graced with enough rainfall for trees to grow (and soils that can hold on to it!), trees generally are at the temerarious edges of their range and susceptible to whatever vagaries of weather may occur, not to mention the potential for longer-lasting effects of climate change.

To top it all off, the pervasive agent of change throughout this entire region is fire—the agent that has reset succession and been a major factor in the composition of area forests. Our exclusion of fire in forests is linked to the atypical, intense wildfires of the past two summers and those of the past 20 years. Fire is also a major factor in the suitability of forests for wildlife because of its effect on vegetation. Some wildlife species favor each of the various stages of succession that fires help provide. Tree species composition in the absence of recurring fires has shifted away from early seral species like western larch and ponderosa pine, and towards mid- or late-seral tree species, such as Douglas-fir and grand fir. Root pathogens have thrived in this setting, giving forest managers one more thing to work around.

In the complex setting of the IPNW, it seems like the challenge would be growing a tree at all, much less an entire forest. Yet, added to all of the factors cited above are weather events that also have the capacity to reshape forests in ways that generally are not a part of any forest management plan. Examples of these events are windstorms, ice storms, hail storms and heavy, wet snows. The IPNW has experienced all of these—some in the very recent past, and some particularly memorable storms over the past several decades such as “Ice Storm 1996,” which caused $22 million dollars in damage, killed four people and left trees across the region in spindles. It remains one of the most damaging storms in this region’s history. A storm that in some ways topped the 1996 storm was the November 2015 windstorm that center-punched Spokane, causing the largest power outage in Avista Utility’s history. Many area residents were without power for a week or more. Area schools were closed for six days.

Table 1. Some ecological characteristics of IPNW conifers

**Least shade-tolerant**

Western larch  Lodgepole pine  Ponderosa pine  Western white pine  Douglas-fir  Engelmann spruce  Subalpine fir  Grand fir  Western redcedar  Western hemlock

**Most adapted to fire**

Western larch  Lodgepole pine  Ponderosa pine  Western white pine  Douglas-fir  Engelmann spruce  Subalpine fir  Grand fir  Western redcedar  Western hemlock

**Most shade-tolerant**

**Least adapted to fire**
days prior to Thanksgiving holiday. Although the Spokane metro area was arguably hit hardest, and urban forests generally suffered the most damage, some damage from this storm extended throughout the region, and in particular seemed to follow state Highway 20 up towards Newport, leaving down trees in its wake.

Other recent weather events have also been notable. In June 2012, a windstorm characterized as providing “microburst” winds of up to 100 mph marched up Ferry County knocking over thousands of trees along the Sanpoil River. In July 2013, two unusually strong windstorms hit the IPNW within three weeks of each other. Both storms caused significant blowdown in the Spokane area. Intense and damaging hailstorms also occurred in 2013. Hail storms were confined to small areas but, where they hit, trees went from green to brown in a matter of a week, causing some tree mortality and significantly affecting the growth and vigor of trees that survived. The fires of 2014 and 2015 were attention grabbers in those years, making the extreme drought of 2015 a side story despite official recognition that it was the hottest, driest year in the IPNW since record keeping began. To end a remarkable 2015, a heavy, wet snow fell across the region in December, bending over any trees that were not fully upright and finishing off a few trees that had been knocked ajar by high winds.

Preparing for extreme weather events

So how does a small forest landowner prepare for extreme weather events? The first step is to make sure that there are no obvious hazard trees hanging over your house. Often such trees are obvious because they will lean, but make sure you also evaluate trees for dead, broken or forked tops as these can split off and fall. Check also for evidence that root pathogens may be at work; poorly anchored trees with root rot can fall unexpectedly in minor weather events or even on seemingly calm days. If you have doubts or concerns about trees immediately around your house or in areas where falling trees might harm others, you can call a certified arborist to assess these. This will not be cost-effective for forest trees in general, so on your forested property you will have to rely on your own judg-

—Continued on next page—
ment or the help of a forester. A primary goal of evaluating your property for likelihood of damage from wind or snow is to check for trees that have the potential to cause unacceptable harm, for example to powerlines, roads, buildings or walkways, then mitigate against that damage to the extent it is practicable. Sometimes this may mean proactively removing a tree.

Thinning forest stands periodically will help keep trees windfirm and prevent trees from developing undesirable height-diameter ratios. Research has found that, in a forest setting, trees with a ratio of about 80:1 (80 feet tall to 1-foot DBH) will generally fare well in snow or wind events. Should height-diameter ratios be greater than this, tree stems will be weak and snow or ice can bend trees over. Trees usually develop high height-diameter ratios by growing in thick stands in which trees compete vigorously for light and therefore put energy into height growth in order to be able to access the sun required for photosynthesis. Such trees put less energy into diameter growth, decreasing tree stability. Forest stands left at very high stand densities for too long can be difficult to restore as these stands are at high risk for damage after thinning. Generally, in stands such as these, thinning should be done in stages so trees remaining after thinning become more windfirm before the next cut occurs.

As for taxes, it is important that landowners establish their basis: the value of the forest at a known point in time. One advantage of having a well-used forest management plan is that it will have an up-to-date inventory that can be used to establish value. If that is known, the damage caused by a weather event can be written off, recouping at least some of this lost value to landowners. Many landowners do not have a management plan, much less an up-to-date or accurate inventory. Foresters can do an inventory after damage is done, but this may be costlier and less accurate than an inventory done prior to an extreme event.

**Recovering from an extreme weather event**

A major storm event can be a traumatic experience for a landowner, but there are pragmatic steps to take after one has visited and left your small piece of heaven in splinters and shambles. The first step is simply to assess the damage—but do it very carefully! Branches on trees laden with ice or snow can snap off at any moment. Trees toppled by wind can spring back upright if the weight holding them down shifts, sending projectiles, people, pets or trees flying.

After assessment it is time for action. If damage is extensive and you do not know your basis, you may consider contacting a forest consultant or otherwise finding a way to establish pre-storm value of your forest stand. However, collecting inventory data may cost more than you will save in taxes. To resolve this, you may need a three-way conversation with a forester, a CPA and yourself.

The next step is to decide what you want to do with the timber that has been damaged. If you are in pine country, you will want to act quickly to get rid of down pine trees before the Ips beetle can invade. If the event happens in late summer, fall or winter, you have time to be deliberate. If the event happens in spring or early summer, you may need to move very quickly to get the wood to the mill before blue stain fungus takes hold. There are accounts of storm-felled wood “bluing” in less than a month during the summer.

Often events will affect only intermittent trees in your stand or only a portion of your stand. If the former, it may be the case that there is too little concentrated volume to make a timber sale economically viable, so you will have to adopt a different plan for what you do with the down wood. If the latter, even if down wood is concentrated in one area, value may be reduced by breakage. Even an area that would have provided good value pre-storm may have little value, eliminating the option to salvage. Often, after an extreme weather event, other landowners are also trying to salvage, resulting in a glut at the mill and a shortage of loggers. In this case, the
price of wood goes down and the cost of loggers goes up and the net value to a landowner can be substantially reduced.

Permitting is a very important part of being prepared. Washington Department of Natural Resources (DNR) now has a 15-year forest practices application (FPA) that landowners can acquire. These cost slightly more than typical FPAs, but they provide landowners tremendous flexibility in the event of a damaging event. To make use of a 15-year FPA, a landowner need only identify the forest areas they may harvest if an event should occur. Landowners can include every mature or maturing forest stand on their property on their list of potential harvest activities. When an extreme event hits, these landowners need only provide DNR two days’ notice that they will harvest and they can begin salvage almost immediately. The contrast is a regular FPA, which may take up to 30 days to approve or deny. If there are unresolved problems on the property, (a common one is DNR classification of streams by type—fish-bearing or not) this process can take much longer, requiring a water-type modification. Landowners who are able to salvage their wood quickly will likely get better prices at the mill, be able to acquire the services of loggers before others and therefore save money.

The next thing to think about is replanting your forest stand, and to do that you will need seedlings. The first calls you will want to make are to agencies that can help secure seedlings for the upcoming year, such as Conservation Districts or the DNR. You may also contact nurseries directly, giving them a precise location of your property. Sometimes after large-scale events seedling supplies are exhausted by high demand and are not available the first year after, so plan to plant seedlings two years after. In this event, more attention may need to be paid to treating brush as it will have had a year head start on planted seedlings, and this is enough to cause seedlings to fail. Landowners may want to consider using a pre-emergent spray on areas to be planted to keep understory shrubs at bay, or plan to manage competing vegetation in some other way. Sometimes seedlings from a specific seed zone and elevation band will be exhausted, but seedlings from an elevation band or seed zone nearby will be available. Some landowners prefer to get seedlings in the ground immediately, so they will use slightly off-site seedlings. It is very important to be sure which seedlings you are getting, and some landowners will prefer to wait for seedlings better-suited to their sites.

**Summary**

In general, the key to recovering from an extreme event is flexibility. The most important aspect of flexibility is the ability to make your own decisions, unimpeded. The most certain way to have that ability in Washington is to have a long-term FPA. Another important tool you will need is the network you have nurtured, as you work with those who are involved in, and care about, your forest. If you know a good logger, forest consultant or mill owner, stay in touch with them. Following the Carpenter Road fire in Washington, a local mill worked with private landowners and the DNR to put dozens of owners on one FPA, expediting the process and making one large logging job out of what would have been many small ones, resulting in competitive bids and more money to landowners. A similar process was used in Stevens County following a 2013 windstorm.

It is also important that extreme events be seen as the opportunities that they are. In many cases, forest stands that had less than optimal habitat for wildlife will suddenly have an abundance. Snapped-off trees make perfect snags and 40 percent of our wildlife species utilize snags. Down materials make perfect piles for squirrels and rabbits and a host of other wildlife species. Some forests have a less-than-desirable tree species mix because of past management, and openings provide an opportunity to better match trees to site, or adjust the species mix.

Be opportunistic, creative and put your knowledge to work. One landowner went around her yard knocking ice off of her ornamental trees and was able to save all of them following the ice storm in 1996. A utility company used the downdraft from a helicopter to push heavy snow off their power lines before it had a chance to absorb rain predicted to follow and saved untold amounts of line from snapping under the weight of a rain-on-snow event.

A few final tips—it should go without saying that all tools should be available and in good repair. In particular, chain saws may be needed just to open your roads. Make sure they’re sharp, you have gas and oil on hand, and they are ready to go. Generators can be helpful if the power goes out for extended periods of time: some rural residents lost power for up to three weeks following the 1996 ice storm. Lastly, dealing with extreme conditions can be mentally and physically exhausting, especially when some things aren’t available, like power to your home. Generators, saws, heaters and tools all help overcome that—but the best thing to have on hand is a good sense of humor and people with whom to build memories and laugh.

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When it comes to protecting the health, viability and economic livelihood of their forests, woodland owners are using federal incentives to their advantage through USDA’s Natural Resources Conservation Service (NRCS).

NRCS offers voluntary programs that help farmers, ranchers and woodland owners perform essential conservation practices on private lands—practices that include reducing the threat of a catastrophic wildfire on woodlands and forests.

Whether it’s proactively thinning forests to reduce the risk of catastrophic wildfire or reseeding burned areas after a fire—woodland owners are discovering that working with NRCS is another tool in their toolbox to help them keep their forests healthy and productive for future generations.

Reducing the risk of catastrophic fire

Just ask Shelly Gray—who, along with her husband Jerry, manages 1,100 acres of mixed forestland and rangeland in Union County in northeastern Oregon. The Grays recently completed a 52-acre thinning project with financial incentives from NRCS and with forest management assistance from the Oregon Department of Forestry (ODF).

“In the summer, we get a lot of dry lightning, and that’s what causes most of the fires up here,” Shelly said. “You can’t control nature. If you didn’t clean up some of the fuels, the fire would just spread and everything would be gone.”

NRCS reimbursed the Grays for a significant portion of the cost to do the precommercial thinning. Additionally, the Grays did some of their own commercial logging within the project area. The end result was a very cost-effective venture that improved the health and natural defenses of their woods to better withstand a wildfire.

“The main purpose of thinning is to reduce wildfire risk,” says Jana Peterson, ODF forester. “By thinning the trees, it makes space between the
crowns and the stems so the fire has less fuel to carry it. So if there is a fire, we can get in there and put it out easier because we're not battling 20-foot-high flames. Instead, we would be dealing with 1- or 2-foot flames.”

A few miles down the road, woodland owner Dave Mellinger is also seeing the benefits of working with NRCS. Last year, Mellinger signed up with NRCS to do precommercial thinning on 119 acres of his 200-acre property on Shaw Mountain.

“You couldn’t walk through here before,” Mellinger said. “The trees were too close. It was full of tall, waxy-leaf brush, which is highly flammable. If we ever had a fire come through, we would have lost everything.”

“I think we’re fireproof now,” he added. “If a fire came through, it’s just going to burn minimally on the ground.”

Mellinger noticed a complete transformation on his property after the thinning. In addition to opening the forest and reducing the risk of wildfire, the thinning also targeted some areas with mistletoe infestations—a parasitic plant that can wipe out entire sections of the forest if left untreated.

“Crowded trees don’t get enough sunlight, water and nutrients for each tree,” Peterson said. “So you have trees that die, or stressed trees that are more susceptible to disease and insects. For example, mistletoe is a parasitic plant that is a big issue here in Northeast Oregon. We implement a top-to-bottom treatment to target the problem trees with mistletoe. So overall, you are left with a healthier stand that’s more resilient and resistant to insects, disease and fire.”

The Grays and the Mellingers are two of more than 50 families that signed up with NRCS to participate in a regional forest restoration project across Baker and Union Counties, called the East Face of the Elkhorn Mountains Project. Under the East Face project, NRCS provides financial incentive payments to private forest owners, while the Oregon Department of Forestry helps them develop and implement a forest management plan.

—Continued on next page—

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specific to their property.

But the East Face project is just one example—NRCS is working with woodland owners all across the state through various forest health and fire risk reduction projects.

“Our goal is to invest our Farm Bill dollars strategically across Oregon to address priority natural resource concerns like forest health and wildfire risk reduction,” said Tom Watson, NRCS Oregon acting state conservationist. “Because of our strong partnerships with ODF, the local Soil and Water Conservation Districts (SWCD) and other groups, we are helping woodland owners restore their forests and keep them healthy.”

**Reseeding after the fire**

In some cases, NRCS may provide financial incentives to help landowners begin the path to recovery after a wildfire. However, funding for these types of disaster response initiatives is very limited and depends on federal allocations from the national level.

Last year was a devastating wildfire season. In Oregon alone, 2,588 fires burned through more than 685,000 acres (which includes both human- and lightning-caused fires), according to ODF data. The fires damaged public and private lands, including working farm and ranchlands and family forestlands.

As the smoke cleared, landowners and local, state and federal officials began to assess the impact of the damage and initiate plans for recovery. Community groups, agencies and partners came together to help one another in whatever ways they could.

Enter NRCS. As part of the post-fire recovery effort, NRCS received national funding to help Oregon landowners reseed the burned areas. NRCS focused the funding on the most damaged areas—the Canyon Creek Fire in John Day, the Cornet-Windy Ridge Fire in Baker City, and the Grizzly Bear Complex Fire...
in Vale.

“The damage was total devastation,” said Misty Bennett, NRCS district conservationist in Baker County. “People lost cattle and livestock; their fences burned to the ground; some people lost all their forage and their trees; buildings were destroyed. It was terrible just looking at the burn severity maps and the vegetation mortality maps—there was just so much damage and devastation.”

In the late fall of 2015, NRCS awarded more than $1.1 million in federal incentives to help 62 families reseed their rangeland, spanning a total of 10,060 acres.

In January, helicopter crews reseeded the burned, snow-covered landscapes—a feat that required close coordination and partnerships with the Grant and Burnt River SWCDs.

As the winter snows melt, landowners are optimistic that their rangelands will begin the path to recovery.

“Most of the landowners wouldn’t have been able to do the reseeding on their own without our help,” Bennett said. “We have our fingers crossed and we’re very hopeful. It was such a hot fire and it was so devastating, but we worked with our partners and the community to get seed on the ground quickly and efficiently.”

Rebuilding the landscape after a wildfire can be a long and challenging process—but it can be done.

“Wildfires are scary, and their effects can be seen on the landscape for generations,” said Misty Seaboldt, NRCS Oregon state forester. “Our goal is not to remove or exclude fire, but to create resilience within the ecosystem so that landowners and forests are in the best possible position to recover following a fire.”

For more information about NRCS incentive programs available in your community, contact your local USDA Service Center. Find a list of Service Centers at: offices.usda.gov.

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**TreeSmarts: Answers to Your Tax Planning Questions**

By John P. Johnston

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**TreeSmarts: Answers to Your Tax Planning Questions** appears every other issue in *Northwest Woodlands*. The column is edited by John P. Johnston, a partner, CPA, and CMA with Bancroft Buckle Johnston & Serres LLP in Seattle, Washington. He is a member of the AICPA, IMA and WSCPA.

Questions can be emailed directly to John at jjohnston@bbjsllp.com.

**Bookkeeping and records retention**

Oddly enough, some of the most frequent questions I get with regards to tax and accounting are not about what to deduct or how to report. They are about much more routine issues in the back office—how to track your accounts and how long to keep things. Following are ten different concepts that just might help keep your records in order, as well as give you some peace of mind.

1) Use the right software for your situation. Believe it or not, for most small businesses this can be an easy and inexpensive decision. I would first consider trying a solution that is easy, inexpensive, been around for a while, and perhaps most importantly, lots of people know how to use it. Depending on your size/complexity, a common off-the-shelf product like QuickBooks, especially the online version, meets these criteria, and I've seen it used successfully for the very small to the very large. Another option that can work well, believe it or not, is Excel. But unless your operation is very small, I wouldn't recommend it without an advanced user ability.

2) If you change software, be smart about it. If you need to change the software you use, make the change at year end, and consider running parallel systems for at least a couple of months before abandoning the first one.

3) Keep up on the detail. This is targeted particularly at the very small business owner—don’t get behind with your bookkeeping! It's much easier to remember all the details, as well as get missing pieces filled in, if you’re doing it contemporaneously. See also number 5.

4) Establish bookkeeping checklists and routines. Create very simple monthly, quarterly, and annual checklists for record keeping. And don’t forget to include the reports you and others need to look at. Many benefits of this are obvious, but one subtler benefit is that, if you or your bookkeeper become suddenly unavailable, someone else will be able to step in and have a fighting shot at keeping things going. I call this the “hit by the bus principal” and discuss it further below.

5) Know when it’s time to outsource bookkeeping. Don’t be too cheap to hire a bookkeeper to do some or all of your bookkeeping if you need to. It is generally far cheaper to pay a bookkeeper’s rates as you go along than to pay your CPA’s rates to fix a mess at the end of the year. Also, there can be an element of internal control, as well as comfort that numbers 3 and 4 above will be met.

6) Know what records to keep. This is much easier to answer these days by simply steering you to a couple of useful websites. The IRS has several good and thoughtful suggestions at: irs.gov/Businesses/Small-Businesses-&-Self-Employed/What-kind-of-records-should-I-keep. The American Institute of Certified Public Accountants (AICPA) also has some very useful information, including a brief guide on the topic, located at: aicpa.org/Career/Marketing/DownloadableDocs/SmallBusiness/SBToolkit_RecordkeepingGuide_Spreads.pdf

7) Know how long to keep records. Just as in number 6 above, the AICPA guide includes a great deal of detail on suggested periods for record retention. In addition to that, I suggest retaining your timberland acquisition information for the longer of seven years or as long as you own the property. This includes the original cruise and forester’s analysis for ALL timberland components (e.g., roads,
land, riparian areas, rock pits, mature timber by age class and species), as well as federal Form T, Forest Activities Schedule. And it may seem superfluous, but I would keep this information even if the parcel has been exchanged in an IRC §1031 tax free exchange.

8) Do not neglect your corporate permanent documents. Permanent documents include things like articles of incorporation, bylaws, LLC agreements, important tax elections, minutes of board or partner meetings, and land acquisitions, just to name a few. Also, it’s easy to forget that laws and regulations change from time to time, and some of these documents should be dusted off, reviewed by appropriate counsel, and updated. For example, Washington State's LLC laws recently went through substantial revision rendering many LLC Agreements obsolete or inadequate.

9) Have a reliable back up plan. These days so much of our life is digitized that this has become critical. In my office we are 99 percent paperless and, like most people, have been relieved to have had a backup more than once. Fortunately, it’s fairly easy and affordable these days, whether you subscribe to a cloud-based service, or even purchase a couple of external hard drives. A quick web search of the topic will give plenty of advice on the pros and cons of the different methods so I won’t go into it here. But two things I will say are: a) make sure you are doing it often and consistently, and b) whichever method you choose, make sure there is an offsite storage component to it. This latter point also helps contribute to a good disaster recovery plan.

10) Always be mindful of the “hit by the bus principal.” I mentioned this above under number 4. It’s the notion that, at any given time, anyone can get hit by a bus and be suddenly and unexpectedly unavailable. If this happens and there is no rhyme or reason to your record keeping, current tasks to be performed, or critical to-do’s coming up, it can cost you significantly. The potentially missed item can be as simple as mailing in an estimated tax payment or getting a piece of vital information to your CPA to make an election that will save you thousands if done by a certain date.

Send in Your Tax Question

Do you have a question that relates to accounting, business, or tax planning? If so, send it to tax expert John Johnston (jjohnston@bbjsllp.com) and he will answer it in the next scheduled column.

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You know how to read a 90 year old log... but can you read the 90 year old tax law?
DEAR TREEMAN, Ok, I got a crick in my neck and a creek in my knees over this question. When is a creek a crick and when is a creek a creek? —Jim

DEAR JIM, I think you thunk about this question for some time, didn’t you? There is a logical progression to solving this conundrum. It requires an instrument to make cognitive decisions (a brain). The brain is the source of our thinking as “headwaters” are to a stream or river, and in our case, a creek or crick or crick or creek.

Extrapolate the preceding logic to the crick in your neck and the creek in your knees and we find a geographical proximity of your crick (neck) and creek (knees) as it relates to your brain: the crick is closer. One more step in this brilliant deductive reasoning and we deduce the creek is of the crick is of the headwaters.

In a region of western Oregon, anecdotal evidence supports our conclusion. Muddy Creek flows from a series of waterways originating in the Coburg Hills. And we know these waterways are indeed “cricks” because they have been designated as such for as long as any of the local inhabitants can recall.

Additionally, anyone traversing the origin of these cricks from Mt. Tom will indeed have a crick in their neck looking up the precipitous slope, followed by a creek in their knees in their attempt to ascend said slope.

Transition is another issue: when does the crick become a creek? Alas, for fear we become obsessive in these waters; when all is said and done: “the great shroud of the creek (sic) rolled as it rolled 5000 years ago.” —Treeman

DEAR TREEMAN, So you need to know that eastern larch, or what I grew up calling tamarack, actually extends its range from the eastern tip of Newfoundland well into central Alaska, actually extending much farther “west” than the range of western larch. So, when Treeman sayeth, “...but accuracy based on geography should distinguish the trees as eastern tamarack versus western tamarack,” I say “Really?” While western larch or tamarack may have the size advantage, as in size matters, our little eastern larch, or tamarack, is the bigger bully with a massive transcontinental distribution, including growing along the shore of Hudson’s Bay.

Having fueled a campfire with both species, however, I can say they both burn pretty much the same ... snap, crackle and pop! —Jim

DEAR TREEMAN #2, Right you are (excuse the dangling participle). Keep in mind we stated “should distinguish” as opposed to “distinguish.” The use of multiple verbs may, and often does, obfuscate the intended meaning of a declarative sentence. As you stated, longitudinally, the eastern larch extends further west than our regional western larch. Should it? No. Does it? Yes.

But the question should be: why? Actually, the answer is quite simple. “Our” eastern larch is suffering from an inferiority complex. In the world of trees, size matters. Observe the coast redwoods of northern California.

Does anyone comment on the vine maple understory? Closer to home, how ‘bout our majestic ponderosa pine? When comparing the two, who mentions lodgepole in terms other than the pejorative?

The eastern larch is continually screaming, “Look at me, look at me!” The “massive transcontinental distribution” attempts to compensate a lack of efficacy in what most associate a tree species and its value to society as measured in terms of economics and the environment: spanning vast areas of North America, searching for an identity and utility to the region’s inhabitants, similar to those of bureaucrats and politicians. Alas, with similar success: a near ubiquitous distribution inversely correlated to their intrinsic value.

And in conclusion, allow us to address your campfires’ “...snap, crackle and pop!” These sounds are emitted from the various resins and water inside the burning wood. As the wood heats up, and in large part due to excessive water trapped inside, the heat from the fire causes the fluids within the wood to boil and then vaporize into steam. The steam is trapped inside the wood. As the trapped steam begins to exert pressure, eventually the wood capitulates, and the snap, crackle or pop you hear is the wood splitting open and releasing steam into the fire.

So snap, crackle and pop has a little something to do with the toxins within the wood and a lot to do with moisture content. Thus, we should give pause in your analysis of the attributes of various tree species as it relates to the quality of a campfire and more emphasis in your selection of wood to burn, irrespective of species. In consideration of the success of your hunting expeditions, one would surmise you would be better-versed in your selection of firewood. If experience is indeed the best teacher, that substitute can of stale beans for fresh venison could at least be enjoyed around a nice campfire. See: wonderopolis.org/wonder/why-does-wood-crackle-when-it-burns/

—Treeman
Successful Restoration After an Insect Epidemic
continued from page 15

approaches best decided with local input from your state forestry department foresters or Extension service foresters. Some options might be tree planting with appropriate species in areas where openings were created during a salvage, thinning the residual trees if overstocked and/or damaged, and, in a mixed conifer forest, adjusting the species mix to a less susceptible composition. For example, if your stand was damaged by western spruce budworm or Douglas-fir tussock moth you can try to alter the species mix to more non-host species such as ponderosa pine or western larch.

• The health of your forest prior to an outbreak is important. Stands with many low vigor trees and with a dominance of susceptible host species at greater risk of mortality than stands that have been managed for resilience and vigor. Stands with good density management, less susceptible species mixes and healthy crowns will recover faster with less mortality.
  • Consider wildlife habitat when doing sanitation/salvage activities, and leave snags and damaged trees when possible for cavity-nesting animals.

Climate change and restoration

There are many uncertainties and challenges as well as adaptive forestry practices to discuss related to climate change science. Unfortunately, there’s not enough space in this article to adequately address the topic here. However, there are some general rules of thumb you can use as you think about restoration and climate change. It will be important to implement a management process that will improve and maintain tree and stand vigor, manage density, enhance or retain species diversity, promote species best adapted to your site conditions and increase overall stand resilience.

In summary, here are some questions to ask as you consider restoration during or after an insect epidemic:
  • What insect species is the culprit (e.g., defoliator, bark beetle)? What do we know about its life cycle and habits? What are the tree host species and forest habitat types? What diameter size classes are affected? Are these insects native and are they known to occur in this forest type?
  • What are the existing forest stand conditions (e.g., uneven-aged, even-aged, young stand, older stand, stocking levels, all one species, multiple species)? Is the affected forest/stand of merchantable species and size? Was it healthy going into the epidemic? What was the weather prior to and during the outbreak?
  • What do we know about this insect from past epidemics in terms of length of epidemic, damage levels, mortality, growth loss, long-term ecological and economic impacts?
  • What are your ownership goals and objectives for your forest? What do you want from your forest now and in the future?
  • What do we know about forest restoration following outbreaks of this insect in the past? Has it made a difference in creating healthy forests, and forests at lower risk of insects, disease and fire? What are the potential ecological and economic outcomes for salvage and restoration? Does the level of damage now and anticipated future damage warrant salvage and restoration activities?
  • What are the potential options for restoration, their costs and benefits? If nothing is done, what will be the effect? Remember, wildlife depends on dead and damaged trees for cavities and habitat. Completely salvaging/sanitizing a forest stand of all dead and down material may negatively affect many wildlife species. So don’t worry about minor amounts of tree death because it can be good for the forest. Take the opportunity to leave some snags and partially dead trees when possible.

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