INVASIVES

The Invaders are Coming

Preventing Weed Spread

Exotic Insects Threaten our Forests

Plant Invaders

Biological Control: New Allies in Weed Control

NEXT ISSUE . . .
Economics of Forest Management

This magazine is a benefit of membership in your family forestry association
THE INVADERS ARE COMING! AN INTRODUCTION TO INVASIVE SPECIES OF NORTHWEST FORESTS
A number of invaders are poised to threaten our forests. Get updated on what they are, how they might affect our forests, and what you can do to curb them in your woodlands.

BY WYATT WILLIAMS

PREVENTING WEED SPREAD IN NORTHWEST FORESTS
Did you know your ATV can pick up large amounts of seed and deposit them elsewhere on your property? This article provides information on methods to reduce weed transport and a range of technical options to deal with this issue.

BY CHRIS SCHNEPF AND TIM PRATHER

EXOTIC INSECTS THREATEN OUR FORESTS
Keep your eyes open and report suspicious damage and insects. Many exotic forest insects can be very destructive.

BY JAMES LABONTE

INVASIVE PLANTS IN WESTSIDE WOODLANDS
Highlighted in this article are the top westside invasive plant offenders. How many are in your woodlands?

BY SASHA SHAW

EASTSIDE INVADERS TO WATCH FOR
What common noxious weeds threaten the eastside? Find out what they are and how to control them in this article.

BY DALE K. WHALEY

BIOLOGICAL CONTROL OF WEEDS: NEW ALLIES IN WEED CONTROL
This article provides a primer on the use of biocontrol agents to control invasive weeds. How does it work? What can you expect? Is it safe? These questions and more are answered.

BY PAUL BRUSVEN

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ON THE COVER:

The feral pig population is growing. This feral swine is released after biologists fitted it with a GPS collar to track its movements. Photo courtesy of Oregon Department of Fish and Wildlife

Noxious weeds can become attached to vehicles and transported to new sites. Photo courtesy of Dale Whaley

Seed weevils, which are biocontrol agents, compete for a spotted knapweed seed head to lay their eggs. Photo courtesy of Nez Perce Bio-control Center

STAFF:
LORI D. RASOR, Editor
4033 S.W. Canyon Rd.
Portland, OR 97221
503-488-2104
rasor@safnwo.org

MINTEN GRAPHICS, Graphic Design

Northwest Woodlands Advisory Committee Members:
Mike Barsotti
Chuck Higgins
Jim James
Elaine Oneil
John Poppino
Lori Rasor
Ed Styskel


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Can you imagine the public response to helicopters spraying pesticides over a heavily populated urban area? For us in Oregon, can you picture that happening over Eugene? The first time this happened was in 1984. *Bacillus thuringiensis*, or Bt, was the insecticide sprayed to kill the invading gypsy moth, a destructive insect most likely brought to Oregon by hitchhiking egg masses on trailers, moving vans, and cars.

The most recent spraying for these moths was in 2009 in southeast Eugene on 600 acres. This aerial spray raised some concern among citizens, but that first spray project covered an astonishing 250,000 acres—forests, rural homesites, and even suburbs! I worked on a public affairs team setting up public meetings on the project, posting maps and times of the early morning spraying, and answering phones all day after the morning sprays were done. It was a big operation with multiple helicopters spraying side-by-side swaths starting at daybreak. And remember, 1984 was 10 short years after the end of the images of helicopters in the Vietnam War, and it was Eugene! Interestingly enough, most complaints were from citizens who were either unhappy with an early morning wake-up call or those who failed to cover their cars. Many of the latter wanted new paint jobs, but they were advised to just wash their car.

The effects of uncontrolled gypsy moth outbreaks are graphically displayed in the forests in the northeast United States. Today the Oregon Department of Agriculture takes seriously any detection of this invasive. In 1984, over 17,000 insects were trapped, triggering that aerial spray project. Invasive insects are serious business.

Invasive plants in Oregon can be equally destructive. If you drive Highway 26 east into Portland toward the twin tunnels, it’s not easy to miss the English ivy growing toward the tops of giant Douglas-firs. Friends of Forest Park host ivy-pulling days, but to me that activity only benefits the volunteers who get a “free” workout. Pulling ivy seems to encourage survivors. Yet the area is a classic example how an exotic plant introduced to stabilize soil and beautify slopes can totally change an ecosystem by destroying native species.

On our property, we have Scotch broom, a gift donated by a logger’s piece of equipment during a 1993 harvest. Two decades later we are still pulling the prolific progeny. A few years ago, after spending a few hours pulling the yellow plants, we drove into Cornelius, just west of Hillsboro. We were welcomed to the new Main Street landscaping, complete with rows of blooming Scotch broom. I should have sold them ours.

You will read about many plant, insect, and animal invasive species in this issue, along with good management strategies designed to either control or eradicate. This information and the references provided, along with the shared practical experiences of your fellow small woodland owners, can help Oregon stem the tide of invasive species.
Invasive species will likely impact the economics and ecology of your tree farm. Land ownership brings the responsibility to control non-native species that invade your woodlands. The kinds of invasive species that impact your tree farm vary greatly across the state. Some were introduced as an effort to improve crop productivity. For example, reed canarygrass grows well in damp pastures, but also in new plantations where it chokes out our newly planted cedar trees. We can live with some non-native species and manage them along with our crops, while others may need to be eradicated.

The US Fish and Wildlife Service has decided to shoot or move barred owls in certain locations to help the recovery of spotted owls. Heck! There are people that view us tree farmers as “Invasive” to natural habitats. We have much more to do in telling our story of sustainable management.

As stewards of tree farms we know that early detection (monitoring articles in the spring 2013 Northwest Woodlands and several in this issue) and rapid response to control a small infestation will always have the best chance for success. I remember when Japanese knotweed was fairly rare and timber company managers quickly recognized the possible widespread threat on their lands and initiated control measures. In contrast, when knotweed started appearing along streams and rivers the first reaction from agency and conservation folks was manual removal like digging and covering with cardboard; herbicide control measures were rejected.

Now that the river bars of the Nooksack River are covered with knotweed and are out of control, selective use of a glyphosate herbicide is recommended under certain conditions.

A few years ago butterfly bush was recommended by nurseries and environmentally friendly gardeners as a plant to attract beneficial insects and birds to your yard. Several years afterward we started to notice butterfly bushes seeding into our extinguished burn piles and road sides. After witnessing this species take over several industrial plantations, we have monitored our plantation and quickly tried to control butterfly bush by pulling young plants and spot spraying with herbicides. We may have it under control, but not eradicated.

Part of protecting our farms from invasive species is being able to identify them and understand their life cycles. Most local, state, and federal natural resource agencies publish bulletins and have website information on invasives. Many counties have local Noxious Weed Control Boards that monitor local invasive weeds of concern and educate the public. They even have the authority to “ensure that landowners control weeds on their properties.” If you do not control priority weeds on your property, they can hire a contractor to remove the weeds and send you the bill.

Forest owners certified under the Tree Farm Program must address invasive species in their management plan and Performance Measure 5.3 states: “Forest owner should make practical efforts to prevent, eradicate, or otherwise control invasive species.”

Owning forestland comes with many responsibilities and addressing invasives in one of them.

Keep ’em growing (the trees, not the invasives!).

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**STARKER FORESTS**

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Forest Space Invaders

When we bought our little tree farm early in the spring of 2007, there was still snow on the ground. While my wife busied herself organizing the house, I was making plans for the forest. First on the list was to conduct an inventory to quantify what was on the property. There was almost 100 MBF on 10 acres—plenty of timber to keep me busy.

When spring fully popped that year, it became apparent that I had only looked up during the cruise, focusing almost entirely on the trees (so sue me, I’m unabashedly tree-centric). I hadn’t noticed all the weeds that had a solid foothold on the property, primarily along the driveway and main skid trails. These weeds were taking up growing space and invading new areas of disturbance and sapping water, nutrients, and sunlight from desired vegetation. The forest space invaders march forward.

Most vexing was the amount of spotted knapweed not only on our property, but also on nearly all of the surrounding properties. Arrrgh! Spotted knapweed is at the top of my Noxious and Obnoxious Weeds (NOW) list...along with anything that even remotely resembles a thistle.

They say that early detection is one of the most important aspects of weed control. I’m sure it is, but I didn’t have that luxury on the property we just bought. I say the best way to control invasive plants is to attack them immediately and unmercifully. Attack NOW! I prepare for battle by loading my backpack sprayer with a carefully measured herbicide and meticulously calibrating my sprayer nozzle for droplet size. I prefer a directed and tarred herbicide and meticulously measured herbicide and meticulously calibrating my sprayer nozzle for droplet size. I prefer a directed and tarred

A calm mid-summer day was a good day for the war on weeds. The weeds were actively growing, the seeds hadn’t set, and there was no wind. I mutter to myself, “Today is a good day for those weeds to die.” So, with a Sioux war cry “Hoka hey!” I charge off into the woods, intent on slaying the enemy. A week later, the carnage was evident with all the leaves wilting, but I missed some. Sigh, charge again. Next week: more carnage, but still survivors. Four consecutive weekends of war cries and wand waving greatly diminished my foes. Since nature abhors a vacuum, I plant trees and/or spread clover seed in the dead spot once occupied by a weed. Duly content in my victory, I sit back to enjoy the spoils (a Pendleton whiskey on ice).

Several weekends later, my wife asked me to fill her bird seeder outside the kitchen window. Although I’m not an advocate of supplemental feeding of wildlife, for the sake of marital harmony I started to comply...until I saw the bag of thistle seed she’s been using to fill the feeder. ARRGGH!!!

Hoka hey!—the war rages on. ■
WHAT TO DO IN . . .

FEBRUARY

• Plant a Tree

When: January, February, and the first half of March are the best months to plant a tree on the westside. On the eastside, it is after the snow melts and the ground thaws.

The Right Seedling for Your Site: Choosing the right seedling or waiting for the right seedling to be available is my advice. If you are unsure which seedlings are suitable for your site, get some advice from a forester, your extension forester or a knowledgeable landowner friend. Or go to www.forestseedlingnetwork.com. This website is a clearinghouse for seedlings that are for sale. You will get the seed zone for your planting site even if you don’t find the seedlings you are looking for.

• Tree Planting Axioms to Hang Your Hat Upon: (or Words of Wisdom on Planting)
  • The best time to plant a tree was 20 years ago. The next best time is to plant one now.
  • If you hit water in your planting hole, don’t plant a tree.
  • If you hit bedrock and can’t dig a suitable planting hole, don’t plant a tree.
  • If the soil is compacted and you have trouble digging a planting hole, don’t plant a tree.
  • No snow or ice in your planting hole. When melted you have an air pocket that dries out your seedling’s roots and increases mortality.
  • If you plan to keep a road open, don’t plant a tree in it, and plant the closest tree one half your planting interval away from the roadway. A typical logging shovel today is 12 to 14 feet wide so leaving 20 feet between seedlings is a good target. Remember, as your trees grow in diameter the space between them gets smaller.
  • Make sure your planting crew knows your intention with respect to closing or leaving roads and landing areas open. They get paid by the seedling and the edge of a road is easy planting.
  • Older planters plant fewer trees per day than younger planters and the boss is normally the only older planter on a planting crew. I am thinking 30 is an old planter.
  • A good planting micro-site trumps spacing.
  • Avoid planting during a cold-dry spell or just before one. Your seedlings are likely to die from dehydration.
  • Dry roots equal dead trees, so don’t plant trees whose roots have dried out.
  • Fine-rooted seedlings like cedar and hemlock are best planted on a rainy day so the roots won’t dry out in your planting bag. These seedlings also don’t store well in the cooler and should be planted soon after they are pulled at the nursery.
  • Shade-tolerant seedlings might need a little sun protection the first year so plant on the north or west side of debris and stumps.
  • On tough sites, stumps are probably the best indicator of a good place to plant a tree.
  • Interplanting in established stands can be a waste of time as the established trees crowd out the interplanted trees. Planting spaces should be 20 feet or larger across and you should be interplanting the year after you established the stand. The longer you wait the less likely interplanting will be successful. Remember, when your target at final harvest is 100 trees per acre, your average spacing is 20 feet between trees.
  • A green seedling growing on your tree farm is worth at least two seedlings in your planting bag.

MARCH

• Things to Do When the Leaves are off your Hardwoods and Brush

Walk all of your forest looking for time sensitive-action items:
  • Invasive weeds that need to be eradicated.
  • Evidence of trespass.
  • Roadwork to be done: Culverts that need to be replaced; grading and ditching needed; new access roads needed; roads to be moved or removed.
  • Wind thrown or sick trees to salvage.
  • Precommercial stands where the density is too high and crowns are declining or a less desirable species is choking out your preferred species.
• Animal, disease or insect damage that requires action.

☐ Walk the perimeter of your property to see what your neighbors have been doing next to you or maybe even on your place. Not sure where your place stops and the neighbor’s place starts? Do you need a surveyor to mark your boundary? When the leaves are off the brush is a good time to survey as your surveyor will have less brush to cut to do the work. Approach your neighbor to share costs.

APRIL

► Who Am I?

☐ I am the largest of my kind in the Northwest at 2-3 lbs.
☐ I am a fearless, silent, deadly, nocturnal hunter.
☐ I am a tree farmer’s friend as a rodent is a good meal for me.
☐ I have two tufts of feathers on my head that could be mistaken for ears or described as horns.
☐ You might catch my silhouette on a perch just before dark.
☐ My call is the closest to the storybook “who” associated with my kind.
☐ Who Am I?

► Protect Your Planting Investment

☐ Remember a live seedling in the ground is worth two in your planting bag. So protect your investment until your seedlings are free to grow. Typical seedling killers are:
  • Grasses that use up the soil moisture and desiccate your seedlings and harbor rodents.
  • Rodents that eat your tree’s roots, eat their bark and girdle them, or harvest your seedlings and take them back to their den.
  • Invasive weeds and non-target species that overtop your seedlings and shade them out.
  • Browsers that eat your new leaders or needles.

► Know Your Woods Words

☐ Shovel: 1) Also known as a spade. A blade or scoop on the end of a handle used to move soil, snow, gravel, etc. by people power. 2) Also known as a track hoe. A piece of logging equipment with a boom used to harvest timber and handle logs such as loading a truck or moving logs to the road or landing.
☐ Bifurcate: What knotty trees do in your woods. Fork and grow two tops. Per Mr. Webster, having two branches or peaks, forked.
☐ Free to Grow: Reforestation term that applies to a seedling or group of seedlings that have survived the elements for a few years and are taller than their closest competition. It is likely they will continue to thrive without being overtopped or endangered by competition from a non-target species.
☐ Genetically Improved Stock: These are seedlings grown from known parents with desirable traits. It would be like you choosing a mate with blonde hair and anticipating a child with blonde hair. No genes were modified so they are not a GMO, genetically modified organism.

Who Am I?

Great horned owl, Bubo virginianus

SUPPORT RESPONSIBLE FORESTRY.

When you consider that only 10% of the world’s forests are certified, we have a long way to go. The good news is that there are a number of credible forest certification programs. And each one, including SFI, encourages responsible forestry. For more on forest certification and what you can do, visit www.sfiprogram.org.

NWW EDITOR SEARCH

Northwest Woodlands is starting a search for a new editor. A job description is posted on both the Oregon Small Woodlands Association and Washington Farm Forestry Association’s websites at www.oswa.org and www.wafarmforestry.com, respectively. Give it a look and let us know if you know anyone who would be a good match for the job.

Sustainable Forestry Initiative

Good for you. Good for our forests.

Down on the Tree Farm is edited by David Bateman with help from Linn County Small Woodlands members Aaron White, Joe Holmberg, Roy Stutzman, Steve Kohl, Neal Bell, Jim Merzenich, Rick Fletcher, Tim Otis, Mike Barsotti, and Brad Withrow-Robinson. This column is a project of the Linn County Small Woodlands Association and the OSU Extension Master Woodland Managers. Suggestions always welcome; send to Dave Bateman at knothead@smt-net.com.
I like watching western movies—not for the six-shooter pistol duels or the dusty allure of cowboy life, but because I dream of being transported to an era where I could witness the raw and untamed landscape of the Great Western Frontier.

But all such movies leave me disappointed.

That shimmering bush John Wayne is hiding behind? It’s saltcedar, an invasive shrub from Central Asia whose populations exploded in the West during the 1930s-40s. The picturesque scene where the outlaws are galloping their horses across vast grasslands? The grass is actually an exotic perennial called smooth brome. How about the rolling tumbleweed, the romanticized symbol of the Wild West? You guessed it: another noxious invader, this time from the Russian Steppe (and aptly named Russian thistle). It is almost impossible to not see invaders in these movies and indeed, our daily lives.

The invaders—a special group of particularly troublesome, exotic, non-native microbes, plants, and animals—arrived to our shores with the first vessels making the voyage across the Atlantic. Sometimes their release was purposeful, other times it was accidental. Regardless, the invasion was barely detectable at first but then picked up steam during the Industrial Revolution of the late nineteenth and early twentieth century. Now, we are facing an onslaught of current and future invaders that will forever change our forestlands, our businesses, and our lives.

Invasive species have a drastic effect

In the U.S., invasive species are responsible for an estimated $120 billion in lost goods and control measures each year, a number some suggest is too low. They are the second leading cause of species extinctions worldwide (habitat degradation is first) with 42% of the federally threatened and endangered species at risk primarily due to invasive species. They vector plant and animal diseases, alter

Common Terms

Terminology in the field of invasive species is almost as diverse as the organisms themselves. Here are a few of the most common ones.

Pest—Any organism that directly competes with humans for a desired resource. Pests can be either native or exotic in origin. Plant pests are called weeds.

Native—Any species that is indigenous to a given region or ecosystem. In the native range, these species have evolved over millennia with one another, sometimes forming stabilizing relationships like mutualism, competition, predator-prey, or parasitism.

Endemic species are a subset of native species that are highly unique to a specific geographical location, such as an individual island or mountain.

Exotic—Any species that has expanded its range by overcoming a geographical barrier, such as an ocean or mountain chain. In large part, these range expansions are accomplished only with human assistance. The term doesn’t necessarily imply effects on the local community, whether good, bad, or indifferent. For example, honey bees and emerald ash borers are both exotic insects. Non-native and introduced are synonyms.

Invasive species—A small subset of exotic species that are also pests. They tend to dominate communities and landscapes in their new ranges with negative effects to biodiversity, ecosystem functioning, and the local economy. The term alien is sometimes used synonymously.

Noxious—Harmful to living things, injurious to health. Noxious weeds are designated by federal, state, and county governments as menaces to the public welfare, often with specific regulations on quarantines and requirements to control on private land.
food chain dynamics, and disrupt ecosystem services, which provide us with clean water, air, shelter, and food.

Despite these impacts, the field of invasive species ecology, which debuted in the 1950s, has recently sparked controversy over seeming to support the narrow-minded philosophy of “nativism”—an irrational fear of newcomers displacing the resident status quo. Indeed, the overwhelming majority of exotic species never establish when they are brought to a new area. Or, they are benign or even beneficial to local ecosystems. For example, the European honey bee is the primary pollinator of over two dozen crop species in the U.S. (many of which are themselves exotic), contributing $14.6 billion annually to our national economy. Still, a small percent, less than 0.01%, of the world’s species are bad players, wreaking havoc on native ecosystems. A real difference exists between “exotic” and “invasive” and there is sound science to explain why.

**Why are invaders invasive?**

Invaders are unique in that they often reach high population densities and outcompete or prey upon native species. To date, science has revealed at least four reasons why certain exotic species become invasive.

Oftentimes when an exotic plant is intentionally transported to a new continent, people undertaking such an endeavor ensure that it is free of its natural enemies—the highly specialized insects and pathogens that evolved over millennia to feed upon their preferred hosts. In the new range, the plant is free from these natural enemies. With nothing left to keep populations in check, the plant proliferates, reaching the status of a noxious weed.

In other cases, the exotic species in question have a superior competitive ability compared to its native counterparts. Through high reproductive rates, extensive dispersal attributes (think spiny seeds of the weed puncturevine), broad tolerances to environmental extremes, and abilities to cope with human activities, some species are simply better than others. These exotics just happen to be better suited than native species in the struggle over limited resources.

Native species can sometimes be naïve to particular pathogens and parasites. Take for instance the eastern U.S. forest invaders, chestnut blight and emerald ash borer, both of which originate from eastern Asia. Within 40 years following its introduction around 1900, the blight virtually wiped out American chestnut while tens of millions of ash trees (*Fraxinus* spp.) are currently being extirpated due to the arrival of the emerald ash borer in the late 1990s. Yet both of these invaders rarely kill their respective hosts in Asia. Why? Because the Asian host trees have evolved specialized defenses to ward off these predators. Our native trees have not; they are sitting ducks.

Finally, recent research indicates that some invaders have a unique ability to undergo “rapid evolution.” Sounds scary, but it’s true. A few weeds currently classified as noxious invaders first spent many generations as just another plant in the ecosystem before undergoing massive population growth and range expansion. It was as if something abruptly changed. Using molecular genetics and cleverly crafted experiments, scientists revealed that these exotics evolved to their local conditions, enabling them to spread and overtake natives. Rapidly evolving invasive plants, such as purple loosestrife, pose great difficulty to land managers in the West.

**Forest invaders in the U.S.**

Several hundred exotic plants, insects, and pathogens have established in the forests of the United

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States. Luckily for us living in the Northwest, most of the invaders occur in eastern hardwood forests. Still, a number of invaders currently give us headaches or are poised to threaten our forests.

Many weeds have a direct impact on forestry operations. For instance, Scotch broom in Oregon and Washington can quickly outcompete saplings for light, requiring in some cases up to three herbicide applications to keep them in check. Moreover, seeds can survive upwards of 40 years and when heavy equipment disturbs the soil, a new crop of Scotch broom quickly appears.

Other weeds that threaten our forest ecosystems include Himalayan blackberry, hawkweeds, kudzu, Asiatic tearthumb, garlic mustard, blackberry, hawkweeds, kudzu, knotweed, false brome, toadflax, leafy spurge, and several thistles and knapweeds. Each has its unique biology and method of spread.

The balsam woolly adelgid, an insect from Europe, attacks our true firs, and the banded elm bark beetle from Asia feasts on urban elm trees. But that is just the tip of the iceberg. Several wood-boring beetles and defoliating moths are not yet established in our western forests, but their threat is bona fide.

Emerald ash borers (true ash), Asian longhorned beetles (maples, willow, elm), and European gypsy moth (several hundred tree and shrub species) are all established in the eastern U.S. and are simply a few day’s drive away from our forests. If any of them were to become established here, they could conceivably transform our local ecosystems and economies.

Several more insects are waiting transport on distant shores.

Finally, the worst for last: tree pathogens. Usually several years go by before they are properly diagnosed and identified. Why? Because tree symptoms often resemble environmental stress such as drought, and many pathogenic species are poorly understood or completely unknown to science until they arrive and trees start dying. The cryptic nature of these fungi, bacteria, and viruses make them difficult to study and prescribe proper treatments.

Our area has been hit hard by a number of invasive pathogens. White pine blister rust on five-needle pine species, Port-Orford root disease, and Sudden Oak Death (see sidebar) are just a few. Others like ash dieback disease, alder root rot, and oak decline are knocking on the door.

With all of these threats, it is easy to get depressed and throw our hands up in defeat. However, a number of tools are available to landowners and forest managers. We can all do some of these today.

**Sudden Oak Death: Working to Slow the Spread**

Sudden Oak Death (SOD) is a plant disease caused by the fungus-like organism *Phytophthora ramorum*. The origin is unknown although it is believed to be an invasive species.

SOD first appeared in California in the 1990s and was detected at a handful of sites in southwestern Oregon in 2001. It is has since killed over a million trees in 14 California coastal counties and one county in Oregon (Curry).

Tree symptoms include lesions and bleeding cankers on stems, leaf spotting and blight, and in advanced stages, tree death. The organism produces spores that are spread through blowing rain and runoff. Contaminated plant and soil material is another means of transport.

Tanoak, California black oak, coastal live oak, and canyon live oak have all shown high susceptibility to this disease. However, more than 120 other plant species can be infected and many show few or no symptoms. Several of these innocuous infections occur on common nursery plants including rhododendrons, viburnums, camellias, and mountain laurels. Douglas-fir, grand fir, madrone, and many others can also become infected.

Since the plant trade is a pathway for this disease, state agriculture departments in Oregon, Washington, and California inspect hundreds of nurseries for the presence of SOD in landscaping plants in an attempt to stop the spread of the disease across the U.S. and the world. To date, the disease has been confined in the U.S. to Oregon and California although increased sampling has revealed its presence in several European countries.

In forests of southwestern Oregon, an aggressive eradication program was initiated in 2001. Annual surveys using airplanes, helicopters, and ground crews are conducted and when a spot infestation is found, the infected material and all possible host trees within 300-600 feet are cut, piled, and burned.

Despite these best efforts, SOD has continued to increase its presence in Oregon with a current 56-square mile “generally infested area” where costly control measures are no longer being enforced. The state’s strategy has changed from eradication to Slow the Spread.

While the costs of the Oregon containment program (nearly $1 million per year) and projected 20-year forest industry losses are high—roughly $31 million—the estimated cost of doing nothing over the same time period is even higher—$292 million.

**Strategies in the fighting invasion**

Preventing invasive species from being transported from their country of origin and subsequently becoming established is by far the best strategy at stopping invasive species in their tracks. Numerous federal and state programs are aimed at prevention.

U.S. Customs and Border Patrol inspect incoming vessels at ports for invasive insects like gypsy moth and wood borers. The USDA Animal and Plant Health Inspection Service issues permits for live plant imports and examines the material for insects and disease. Each year, federal, state, and university entities coordinate a large detection program called CAPS—Cooperative Agricultural Pest Survey. Despite these effective and efficient tools, they have been subject to budget and staff reductions in recent years and desperately need public support.

Targeting the pathways of invasion is another highly effective means of...
prevention. Over 70% of damaging forest insects and pathogens established in the U.S. between 1860 and 2006 likely entered our country on imported live plants. A significant remainder arrived on wood packaging material (e.g., pallets). Several weeds are the result of horticultural imports gone bad. Safeguards that maintain trade volume are continuing to evolve, and consumer education may also prove important in invasive species prevention. Within our borders, woodborers are transported long distance via firewood (see dontmovefirewood.org).

Early detection and rapid response (EDRR) is another tool in the toolbox, one that provides a 34:1 benefit to cost ratio for noxious weed programs. This strategy relies on informed landowners and land managers to recognize and report invaders early in the invasion process when eradication is still feasible (see Figure 1).

To this end, state agriculture departments in all four states receiving this publication publish and maintain noxious weed lists with information on identification and control. Additionally, Oregon, Washington, and Idaho each have formed Invasive Species Councils with online resources dedicated to EDRR. Oregon has developed an online EDRR hotline where anyone can report suspect invaders (see oregoninvasiveshotline.org). Finally, several state agencies, soil and water conservation districts, and nonprofits have produced pocket-sized EDRR guides with clear, diagnostic images.

When invaders have gained a foothold and eradication is not feasible, the focus shifts to long-term techniques, such as Integrated Pest Management (IPM) where every control strategy is considered and some level of lost resources is accepted. IPM strategies include biological control, the re-introduction of an invader’s natural enemies from its home range—a strategy that is safe and effective.

More recently, much ground has been made on breeding resistance into trees for specific invasive species. Researchers have crossed Chinese and American chestnuts to produce a tree that is resistant to chestnut blight, yet 87% of its genes are of U.S. origin. Similar programs are underway or have been developed for Port-Orfordcedar and root disease, pines and blister rust, and eastern hemlock and woolly adelgids. Several other resistance programs need our vocal support including those for ash and emerald ash borer.

In this issue of *Northwest Woodlands*, you will learn about particular invasive species specific to our area and means of dealing with them. My hope is that the threats seem real and each of us will be vigilant when walking and working in the woods. If you see something unfamiliar, document and report it. Attend a Master Woodland course or a public weed board meeting to catch up on the latest information. Peruse the web pages of our area’s invasive species councils.

After all, we have a lot to lose here in the Northwest. Besides the obvious degradation of our livelihoods and our lands, just think of the yet-to-be-made western movies and how they would appear with new noxious weeds or the loss of entire tree species from our landscapes. Together we can protect our forests from invasive species.

**Wyatt Williams** (Ph.D. Bioagicultural Sciences, Colorado State University, M.S. Biology, Boise State University) is an Invasive Species specialist, Oregon Department of Forestry in Salem. He also serves on the Oregon Invasive Species Council. He can be reached at 503-945-7472 or wwilliams@odf.state.or.us.
Most forest owners would like to minimize weed species on their property. In addition to state laws regarding weeds, forest certification programs are also beginning to address invasive species. Forest owners can choose from several strategies to prevent weeds from establishing and spreading through forests.

Keeping weeds out

The most important strategy in reducing weeds is to keep them from establishing on your property in the first place. Preventing weeds from establishing is not necessarily cheap but it is much less expensive than a chronic problem that requires resources applied to reduce the negative impacts. Weeds have many natural methods of moving around on the landscape, including via wind and wildlife. But human actions play the most important role in weedy species movement to and through forests.

Landscape Plantings. A surprising number of weedy species are brought to sites intentionally. For example, some homeowners have established knotweeds or broom species as landscape plants, only to have them spread from those landscapes to surrounding forests. Nearly 90% of weedy shrubs were ornamental and 60% of weedy forbs were ornamentals.

Livestock. Weeds can also be brought in via hay for livestock. Forest owners who allow horses and other livestock access to their property may want to require “certified weed-free hay.” For more information, contact your county weed authority or visit the websites listed in the sidebar. Have recreational users stay on trails and if you know of specific weed species in your area, restrict access when seeds are mature to avoid livestock bringing weeds.

Road Material. Weed seed can also be brought into forests via gravel and other materials brought in to build forest roads. Are your sources for gravel or rock infested with weeds? Controlling weeds at barrow pits and areas where road building and maintenance equipment are stored reduces weed movement from those sites to forests.

Vehicles and seed

All ground vehicles can transport weeds to forests, particularly on vehicle parts closest to the ground. Weed seed can be transported hundreds of miles on a vehicle. Summer and fall are critically important seasons since most weeds have set seed by fall. Fourteen times more seed can lodge on a vehicle that moves off the trails/roads during the fall than during other times of the year. Rainy, wet periods are also critical, as the moisture makes it easier to stick seed to the vehicle (especially if it is mixed in with mud). On wet roads, seed comes off more easily as well (especially on a wet highway). Dry or frozen roads and soil conditions are less of a problem.

Cleaning vehicles. Cleaning equipment used in forestry can be part of the solution to preventing new weed invasions. Logging and road building equipment is of special concern, because it is typically moving to sites that will be freshly disturbed—an
ideal environment for weed establishment. Tracked vehicles such as crawler tractors pick up twice as much seed as wheeled vehicles. However, frozen ground conditions are reduced risk periods. If the equipment was cleaned before use in frozen conditions, risks are greatly reduced and washing should be a lower priority.

Pressure washing vehicles’ undersides before driving them to a new site can help reduce weed seed transport, especially in the spring and fall. Cleaning parts of equipment close to the road (bumpers, undercarriages, and especially wheel wells) is the highest priority. Eighty to 90 percent of weed seeds can be removed by 3 to 6 minutes of washing.

If you are doing a lot of washing, equipment that is specialized to clean the undersides of trucks and other logging equipment is helpful. At a minimum, having some kind of raised platform to drive a vehicle onto helps you get at the underside with a power washer. More sophisticated devices feature an array of power washing nozzles built into a platform to wash the vehicle’s underside—not unlike how a car is washed in a commercial automatic car wash. Some of these systems include features to capture waste water and re-use it. These latter devices (see references) are being used for washing stations at wildfire sites, where a variety of equipment is brought in to fight fire. In some cases multiple landowners and loggers may wish to establish shared washing station sites. Weeds must be controlled at washing sites as well.

Minimize logging equipment and ATV use off-trail. Vehicles typically collect more seed when they move off roads and trails, therefore another weed reduction strategy is to minimize equipment in these areas. This is also important for forest soils and water quality so many timber sales restrict equipment to designated roads and trails. If a logging site has a lot of weeds, controlling them before bringing equipment there reduces the odds of equipment picking up weed seed and transporting it to other locations. Controlling weeds prior to logging also reduces the impact of those weedy species on the logged site where they can interfere with tree seedling development.

A bigger concern is with ATVs, which can pick up large amounts of seed and commonly move off trails, where they both collect and deposit seed. This is especially true during a wet fall, when lots of seed can stick to the vehicle more easily.

Keeping ATVs on roads reduces weed movement.

---Continued on page 26---
Native insects such as western tent caterpillar, spruce budworm, and bark beetles are sporadic pests of northwestern forests and woodlots. However, our forests now face novel threats in the form of exotic insects introduced from other countries and such pests may be more damaging than the natives. Furthermore, there are often no good methods of detection or eradication and control of these insects. In some cases, we know virtually nothing about these exotic insects other than their names and where they came from. On several occasions, species new to science were first recognized when introduced into North America.

Exotic insects are now a fact of life everywhere in the world. Global trade moves these creatures from one place to another with increasing ease due to expanding trade and modern transportation. Over 400 species of exotic forest insects have been introduced into North America and at least a third of the major forest insect pests on this continent are exotic species. These pests can completely change the character of our forests by eliminating or greatly reducing vulnerable hosts. For instance, the smaller European elm bark beetle, along with the Dutch elm disease it transmits, has virtually eliminated elms from eastern forests.

Forest pests are particularly easily transported from one area to another, in or on cargo (such as raw lumber) or packaging (such as crates or pallets), or as hitchhikers in containers. Once established in North America, they can then be easily carried elsewhere in the continent via those pathways and others. Another all too effective means of transport is when these pests are carried on or inside firewood. In Oregon alone, new exotic insects have been found about once a month for the past seven years. Fourteen were forest species, including some that are (so far) minor pests. However, it is just a roll of the dice before a severe forest pest is introduced and permanently established.

**Exotic forest insect threats**

Defoliators, sap-suckers, and wood borers make up the three major categories of exotic insect tree pests. **Defoliators.** Unless severe defoliation occurs repeatedly, broad-leaved trees can often recover from attacks of exotic defoliators; however, this not the case for conifers, which can be killed outright by extreme defoliation. Asian and European gypsy moths (AGM and EGM, respectively) are major threats to northwestern trees. The caterpillars, best known for feeding on broad-leaved trees including oaks, maples, and alders, also relish Douglas-fir foliage. EGM is established throughout much of the East, and the eggs and cocoons are carried to the Northwest on vehicles and belongings stored outside. AGM egg masses regularly arrive on ships carrying cargo from Asian ports. Gypsy moths were first detected in the Northwest in 1979 and almost continual infestations have followed since then. Fortunately, excellent traps are available to enable early detection of gypsy moths and there are safe and effective pesticides for their eradication or control. To date, all known northwestern gypsy moth infestations have been eradicated except for several recent infestations currently under eradication.

Many other exotic defoliators threaten Northwest trees but most have far narrower host ranges than gypsy moths. For instance, the green alder sawfly from Europe only attacks alder. It was first detected in Oregon and Washington in 2010 although museum specimens show it has been in Washington since at least 1995. It has done little damage in the Northwest but has caused substantial alder defoliation in Alaska.

**Sap-suckers.** Exotic sap-sucking insects such as aphids and scales can be very damaging tree pests and extremely difficult to detect. Eradication is normally impossible once they are introduced and control can be problematic, especially over large areas. The best strategy is to introduce predators or parasites for biocontrol. However, this can be expensive and there is no guarantee that effective agents will be found or established. Spruce aphid, a European species long established in the Northwest, has
at times killed spruce throughout much of the Pacific coast. Balsam woolly adelgid, also a European species, is a pest of true firs and has been established here for decades. Although a major tree killer in the past (and continuing to be so in the East), this adelgid has not been a significant problem in the Northwest for years and is often even difficult to find. This may be due to control exerted by native and introduced natural enemies.

**Wood borers.** Most native wood-boring insects primarily attack dying or recently dead trees, playing an essential role in wood decomposition and the cycling of nutrients in forests. In contrast, exotic wood borers can be extremely destructive, often killing otherwise healthy trees within a year or two of infestation. Our tools for detecting these pests are very poor, and in most cases, they are detected too late for eradication. Even if detected early on, eradication is often difficult or impossible because wood borers spend most of their lives protected inside the trees they attack. The only “effective” strategy in most instances is to cut and destroy (by chipping or burning) infested trees. Numerous exotic wood borers are established elsewhere in the US that could threaten northwestern trees. It is only a matter of time until they arrive here.

Emerald ash borer, an Asian metallic wood-boring beetle established in the Midwest and East, could effectively eliminate ash from North America. Its impact in the Northwest will be less than elsewhere as we have only one native ash, Oregon ash, which is not usually a major forest component. The primary effects will be on street trees and nursery stock.

Asian longhorned beetle is established in several areas in the East and Midwest. Although these infestations are under active eradication, prospects for success seem slim. This beetle attacks a variety of broad-leaved trees including maples, willows, cottonwoods, and elms. Oaks are not attacked but are threatened by the gold-spotted oak borer. This beetle, related to emerald ash borer, is native to southeastern Arizona and Mexico and has been killing oaks in southern California for several years. The European wood wasp has killed millions of pines throughout the world and is now established in the East. Although not yet causing significant damage there, its effects are most severe when linked with drought, a frequent occurrence in many of our forested areas in the Northwest.

**Others.** Native ambrosia beetles, a group of bark beetles subsisting on wood-feeding fungi (the “ambrosia”) they carry to host plants, normally do little more than kill a few twigs. Exotic ambrosia beetles include some species which, in combination with their mutualistic fungi, can be tree killers. Because they actually eat their fungi rather than wood, these beetles can have host ranges including hundreds of woody species in many different families, including both broad-leaved and coniferous trees. An Asian species established in the Southeast, the red bay ambrosia beetle may exterminate red bay and threatens other trees in that family, including avocado, sassafras, and California bay laurel. Another Asian introduction, the granulate ambrosia beetle, is a severe pest of nursery stock, ornamentals, and orchards in the Southeast. This beetle was introduced into The Dalles, Oregon, in the Columbia River Gorge in 2004 in raw railroad ties from the Southeast and not only threatened orchards and nurseries but also forest regeneration. Early detection and aggressive action by the Oregon Department of Agriculture resulted in the first known eradication of an exotic ambrosia beetle in the world. These are just 2 of over 60 species of exotic ambrosia beetles known in North America.

**Future prospects**

Keeping exotic forest pests out in the first place is the best and most effective strategy. International regulations and increased scrutiny of high-risk materials have reduced the threat of exotic forest pest introduction. Effective domestic regulations restricting interstate firewood movement are also helping.

However, these actions cannot keep pace with the volume of imported materials and the global and domestic movement of vehicles and containers. Where regulations and inspections fail, surveillance enabling early detection and rapid response must serve instead. In addition, basic research is necessary to acquire critical information for developing effective traps, lures, and means of eradication or control for exotic forest pests. Unfortunately, funding for such vital activities has been steadily declining for years and improved future funding prospects appear dim. The consequences of this trajectory are predictable. There will be more and more challenges to the health of Northwest forests and woodlands with fewer and fewer resources with which to address those problems. This makes it all the more important for forest owners to be aware of exotic forest insect pests and to promptly report any suspicious damage or insects to state or federal agencies.

**James R. Labonte** is a taxonomic and survey entomologist for the Oregon Department of Agriculture, Plant Division, in Salem. He can be reached at 503-986-4749 or jlabonte@oda.state.or.us.

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**Image 283x609 to 378x731**

There are no effective traps or lures for this Asian longhorned beetle. Almost every infestation in North America was discovered when non-entomologists reported encountering this distinctive beetle.
Invasive Plants in Westside Woodlands

By SASHA SHAW

The world of weeds can seem overwhelming, but in westside woodlands there are a few that really stand out. In this article, I highlight some of the main offenders, and refer you to the many excellent online resources for learning more about these and other invasive plants in our region. There wasn’t enough space here to include control tips for these species, but you will find that information in the online resources (see resource list sidebar on page 23).

Two invasive woody vines to watch for are English ivy and old man’s beard. English ivy is often found in conifer forests, and old man’s beard is more often found in deciduous forests and along forest edges. Both species can cover even very large trees, adding hundreds of pounds of weight and dense growth that blankets the tree’s foliage.

Shade-tolerant, evergreen English ivy can completely dominate the forest understory as well as the tree canopy, even in closed-canopy conifer woodlands. Individual ivy plants can live over a hundred years, and forests can eventually be reduced to “ivy deserts” as old trees fall and aren’t replaced.

Old man’s beard is a newer invader, but has shown itself to be a serious problem as well, especially for deciduous and riparian forests, and has even been mistaken for kudzu (the vine that “ate the south”). Speaking of kudzu, this notorious invader has been found growing in Oregon and Washington occasionally and should be reported and controlled immediately to make sure it doesn’t get established here.

Himalayan blackberry (from central Europe, not the Himalayas, in spite of the name) is by far the most prevalent invasive plant on the westside. Originally imported to the west coast for berry production starting in the late 1800s, this aggressive plant is now well established throughout the Pacific Northwest. Himalayan blackberry forms impenetrable thickets, lowering plant diversity and generally covering everything in its path. In less than two years, one cutting can produce a 15-foot diameter thicket. Himalayan blackberry out-competes forest plants and can even prevent establishment of trees such as Douglas-fir.

Scotch (or Scot’s) broom, a close second to blackberry (or even first in some parts of our region), is mostly limited to open areas like clearcuts, rights-of-way, and riversides. However, Scotch broom seed persists in the soil for over 50 years, allowing it to reemerge whenever an opening is created by cutting or a natural disturbance like a fire or flood. Scotch broom is from Western Europe and was planted widely in Washington and Oregon beginning around the 1860s and continuing until recently, when the plant was added to the state quarantine lists. The Oregon Department of Agriculture estimates that Scotch broom costs Oregon $47 million per year, mostly in lost forest production due to delays in re-establishing trees. Scotch broom also increases the risk of forest fires.

Gorse is a large, spiny, evergreen bush that looks like a meaner version of Scotch broom, and is an even bigger fire hazard. Brought from Ireland to the Northwest in the 1800s, it now forms extensive stands along the coasts of Washington and Oregon. It can be found in forests and along rights-of-way throughout the region, but is especially common in coastal areas.

Butterfly bush is a tall shrub imported from China and Japan and popularized for butterfly gardens and water-wise landscaping. Unfortunately, it produces prolific quantities of tiny seeds that are spread for miles by wind. The seeds germinate in sunny, open areas such as gravel bars, sandy riverbanks, forest openings, and roadsides. In a single season, this plant can grow from a seedling to a mature plant. In western Washington and Oregon, butterfly bush has spread into even remote woodlands and riparian areas where it impedes natural tree regeneration after floods or fires.
timber harvest.

English holly has escaped in many places in western Washington and Oregon, and can show up even in very shady, intact forests. Holly spreads mostly by birds that eat the berries and it has become established even in areas with healthy forests that don’t have any other invasive plants. At times, holly can form thickets of closely packed understory trees, creating such complete shade that few plants can grow underneath. Holly is also a valuable crop and landscape plant in western Washington and Oregon, and not all varieties may be invasive.

Non-woody (herbaceous) weeds constitute a huge group, so I will only cover a few of the worst ones. Some of the most aggressive invasive plants you are likely to see in forest openings or disturbed areas include non-native thistles (mostly Canada thistle and bull thistle), tansy ragwort, and non-native hawkweeds. These species all respond quickly to disturbance and can be hard to control once established. When an opening is created by thinning or natural forces, make sure to visit the area during the following season to check for these and other invaders.

Knotweed is one of the toughest non-woody invaders. Actually three closely related species (giant, Japanese and Bohemian), and one less closely related (Himalayan) knotweed is most common right along the edges of rivers and roads, but can also penetrate deep into the woods. Once established on a river, knotweed spreads downstream by root and stem fragments. Tough to control, it usually takes a cooperative effort between private and public landowners over an entire waterway to eradicate knotweed successfully.

Butterfly bush invades by seed into forest clearings, where it suppresses tree regeneration.

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During the last 500 years, humans have caused an unprecedented redistribution of the earth's living fauna. When we hear the term “exotic” species, people think of animals such as Asian carp, killer bees, or starlings. News articles or television programs about the introduction of the northern snakehead into the Great Lakes or pictures of exotic zebra mussels clogging a drain pipe also come to mind. Yes, these are invaders, and yes, it is good they are recognized, but let us not forget that one of the biggest and most problematic invaders we face today are invasive plant species.

When a plant is called a “weed” it can be subjective depending on whom you are talking to. If a plant is growing where we don’t want it, it’s called a weed. The simplest definition of a weed is a plant out of place. Under this definition, a beautiful flower growing in the middle of your lawn would be classified as a weed; anywhere else it may be perfectly acceptable.

Unwanted plants that carry the title of noxious weeds are in a league of their own. These plants almost always cause significant harm, especially in natural or lightly managed areas where they can rapidly transform the local plant community. Although some native plants can be weedy, these plants do not possess the necessary characteristics to vault them into the noxious weed category (see sidebar).

If one was to examine their local noxious weed list, it would be quickly noted that the list is predominantly invasive plant species. These noxious weeds do not know property boundaries—they simply do not care if they are invading private, county, state, or federal lands.

A few of the common noxious weeds found east of the Cascades are profiled below.

Diffuse knapweed first showed up in eastern Washington in 1909 and was thought to have been introduced as a seed contaminant. The plant has since spread to infest nearly a half million acres across all counties east of the Cascade Mountains. The plant is well adapted for survival in disturbed, semiarid environments as typified by degraded rangeland and pasture, fallow land, neglected residential and industrial properties, gravel pits, clearcuts, river and ditch banks, and transportation rights-of-way. Diffuse knapweed can be classified as either a biennial or short-lived perennial with a well-developed taproot. The plant overwinters as a rosette of deeply divided leaves or as seed in the soil. The overwintered rosettes bolt the second year of growth to produce plants characterized by upright, diffusely branched architecture and small, stalkless stem leaves. Diffuse knapweed flowers are usually white, but may be rose-purple or lavender. Flower heads are solitary or borne in clusters of two to three at the ends of the branches. Each head bract is edged with a fringe of small spines and tipped with a pronounced spine.

A close cousin, spotted knapweed, is also prevalent in many parts of eastern Washington. Unlike diffuse knapweed, spotted knapweed is a perennial and has purple flowers and dark-tipped bracts (hence the name). These characteristics can help distinguish between the two species.

Dalmatian toadflax is a member of the figwort family and has been labeled by land managers as one of the worst noxious weeds. It originated in Eurasia and was intentionally introduced into the United States in the 1890s for its ornamental and medicinal value. In no time at all, this aggressive plant escaped from its garden confines and spread to infest farmland, pastures, rangeland, and transportation rights-of-way throughout the country. An extensive root system, high seed output, and waxy cuticle make this yellow-flowered plant difficult to control. Heart-shaped leaves can help distinguish it from yellow toadflax, a close relative, which has narrow needle-like leaves.

A big economic impact from these invaders is simply the increased cost to the small woodland owner’s pocket book. Weed control can become expensive, especially on a large scale. Avoiding impact to the environment, while still getting good weed control, can be costly and labor intensive. However, for all noxious weeds, it is imperative that landowners be mindful of the problem that these invaders can cause and be able to take proper action when necessary.
What can be done?

When it comes to managing noxious or invasive plant species, the first line of defense is to be able to distinguish “good vs. bad” plants. Correct identification using identification books can save landowners both money and time in the long run. Any long-term, economical, and environmentally sound solution to suppress these three weed species must involve an integrated management approach. Integrated Vegetation Management (IVM) is the practice of using biological, chemical, cultural, and physical control methods together to control unwanted plant species. Plants reproduce either from seeds or roots, or from both, i.e. perennials. Stopping weeds from reproducing is a must.

Mowing weeds at the bud stage prior to seed development is a good management tool provided it doesn’t disrupt the presence of competitive vegetation. Hand-pulling or digging up small weed infestations is effective if most (if not all) of the root system is removed.

All three weed species can be effectively controlled with herbicides. Herbicide recommendations are available at your local weed board office or from your county extension agent. However, successful long-term management for these species cannot rely upon repeated chemical applications. Herbicide purchase and application can be costly and can raise environmental concerns if improperly used. Any long-term solution should involve an integrated management approach wherein biological control organisms are deployed along with a judicious use of herbicides and other suppressive strategies.

Biological control can be thought of as the intentional use of the plant’s natural enemies: mites, pathogens, nematodes, and insects are used to reduce the weed’s vigor and reproductive potential to shift the competitive balance back to native or more desirable vegetation. Luckily, there are several organisms that have shown to be very effective.

The final and most important management tool is prevention. As its name implies, the idea is to prevent new, unwanted introductions of weeds. Weed-free forage, mulches and gravel, truck or boat washing stations, and using certified seed whenever possible are all forms of prevention. However, if invasive plants make it beyond preventative tactics, then the new introductions must be aggressively eradicated before they become well established. This is called “early detection-rapid-response” and the concept is simple. If new or small noxious weed infestations can be detected before they become too large or widespread, then the problem has been stopped before it is started, thus saving time and resources.

Lastly, it is imperative that landowners develop a restoration strategy for areas once invasive weeds have been controlled and/or eliminated. This strategy goes hand-in-hand with prevention. This step is often overlooked in vegetation management programs. Re-seeding areas with natives or other types of competitive vegetation can help keep these and many other unwanted invaders at bay. Unfortunately, we often know how to effectively kill weeds or unwanted vegetation, but are all too quick to forget that we are causing a disturbance to the plant ecosystem when we do so.

Dale K. Whaley is an Integrated Weed Management-Agriculture Regional Extension specialist in Waterville, Wash. He can be reached at 509-745-8531 or dwhaley@wsu.edu.

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Biological Control of Weeds: New Allies in Weed Control

By PAUL BRUSVEN

Over the past 200 years, thousands of foreign plant and animal species have become established in the United States. About one in seven has become invasive, pushing aside native species. An invasive species is defined as a foreign species whose introduction does, or is likely to, cause economic or environmental harm or harm to human health. Invasive plants, animals, and aquatic organisms have significantly reduced the economic productivity and ecological balance of US agriculture and natural resources. Many of our invasive weed problems originate in Europe and Asia at a climate similar to North America and where they are not “weeds” at all; they are simply being plants as part of the natural landscape evolving through time along with their natural checks and balances.

Biological control is one of many tools that can be used to control invasive weeds.

Biological control puts natural enemies—whether plant, animal, or insect—to work against invasive pests. Classical biological control of weeds is the intentional importation and release of carefully selected natural enemies (usually insects) that are host specific to a targeted weed that reduces the vigor and reproductive potential of the non-native weed. The term “host specific” is key to biological control of weeds and means that the biological control agent will die if it does not have its host weed. This also means that all the other plants that are part of the landscape, including garden plants, agriculture crops, and native plants, will not be harmed by a biological control. While the most common biological control agents used are insects, mites, and nematodes, plant pathogens are also used.

A biological control agent attacks its host weed and normally targets a certain area on the plant, such as its seed head, stem, or roots, or the agent may defoliate the host weed, thus decreasing its competitive advantage over native or desirable vegetation. Successful biological control programs include multiple agent species that attack different parts of the weed.

An example is to release both the seed head weevil and root weevil for spotted knapweed. Together they reduce seed production, slowing the weed’s rate of spread across a landscape, and also provide an extra punch by destruction of the root system, resulting in a weakened plant over time. This process brings the weed to its demise and provides more opportunities for native vegetation to reoccupy the space once used by the weed.

Using multiple agents against the weed usually results in a quicker control of the weed, but one must be patient to see a decline in the weed population. It usually takes 3-5 years to get agent numbers high enough to decline the weed population. It is important to realize that biological control agents will not completely eradicate the weeds. The goal of using them is to reduce the weed population to a desirable level and maintain a balance between host weed and biological control agent.

In the Pacific Northwest, biological control agents have shown well-documented success in the control of Mediterranean sage, St. John’s wort (Klamath weed), tansy ragwort, Dalmatian toadflax, and purple loosestrife. Preliminary information indicates emerging successes for diffuse knapweed using a weevil and leafy spurge using a flea beetle.
Biological control agents are intended to be used on a larger landscape, where other control methods (spraying herbicides, mowing, hand pulling, replanting competitive vegetation) are not practical due to difficult terrain. The use of biological control agents can be used in conjunction with the other weed-control methods mentioned above as part of an integrated pest management strategy.

Once biological control agents are released, do not spray directly over this area for at least 3 years, as your natural weed warrior needs to be left with adequate food and proper habitat to sustain and build its population. Biological control agents will die if they do not have their host weed. It is best to leave at least one acre (ideally 5 acres) for your new agent to increase in population. The perimeter of the release area can be sprayed to keep the weed from spreading out while the agent population builds in numbers.

Areas smaller than one acre should not be considered for biological control releases unless the area is environmentally sensitive (special vegetation areas, wetland areas, open water areas) to the other control methods already discussed.

The basics to utilizing biological control

Biocontrol agents are collected, containerized, and distributed to other areas with similar climatic characteristics. This typically happens from May through September depending on the specific agent species.

It is best to collect the agents when they are adults and then transport them to their new area as soon as possible to decrease their stress and have them ready to do their damage to their host weed.

It is advisable to get your agents from insectaries as close as possible to your weed infestations to synchronize (climate match) the agents with the host weed.

Once released, the biological control agent (generally 50-1,000 insects) establishes on its host weed and continues to multiply over time (normally 3 to 5 years) with a reduction occurring in the weed population until a balance between the host-specific biocontrol insect and its host weed occurs.

Biological control agents come from where our weeds originated

Most of the biological control agents in use today are imported from Europe and Asia. All agents imported to the United States are shown to be host specific to a target weed and is literally tested to death to ensure safety to the environment. The cost to test a new weed biological control agent is about $1.5 million. Remember, the key to all the necessary testing is to ensure the new agent is host specific to only the host weed and no other plants.

Biological control of weeds has an outstanding record of safely managing invasive weeds for over 100 years. Worldwide, 133 weed species have been targeted, and more than 350 biological control agents have been introduced into 70 countries. Biological control of weeds is stronger globally now than ever before. One of the most important reasons for this increased support is that land managers have realized there are few effective and sustainable tools other than biological control to manage invasive weeds on larger landscapes.

Release tips and costs

Private landowners are becoming more involved in making biological control releases on their own properties and are incorporating weed control methods in an Integrated Pest Management strategy.

As indicated earlier, initial releases range from 50 to 1,000 agents collected from a nearby developed insectary and are put into a cardboard pint- or quart-sized container and delivered to the new release location. All collected releases should be kept cool (not

—Continued on next page—
frozen) and dry to minimize stress and maintain their health. The agents should be released within 2-3 days from the time of collection.

Releases are made by dumping the insects at one spot on the edge of the weed infestation rather than sprinkling them around as you walk through the target weed infestation. The idea and practice is to keep the initial releases of insects together and concentrated as long as possible after release to promote mating and egg laying. It is also a good practice to make your releases early in the morning or in the evening when air temperatures are cooler to increase chances of successful establishment. One final tip is to look at the ground within your weed infestation for ants prior to making your new agent release. If you see a lot of ants, move to another location, as they are predators of other insects and this includes your valuable weed-eating biocontrol insects. Generally, most biological control agents establish best on southern aspects or sites that receive a lot of sun. Weevil biological control agents normally move uphill and in the direction of prevailing winds, so it is helpful to use this to your advantage as you plan where to make your initial release. Once agents establish from your initial release they will seek and find other weed patches within your area, including your neighbors’ properties.

Cost for receiving releases vary and range from $35 to $200 per release depending on insect species and availability. Releases may be free through scheduled educational workshops and collection days.

If you are interested in trying biological control agents on your weed infestations or to determine if you already have them on your property, contact your local county weed department, state department of agriculture, or land-grant university.

For website references to get additional invasive weed and biological control information, go to pnwhandbooks.org/weed/websites-interest.

**Biocontrol Workshops Offered**

The Nez Perce Tribe Bio-control Center (NPBC), in cooperation with the Idaho State Department of Agriculture, University of Idaho, USDA Animal Plant Health Inspection Service (APHIS), Bureau of Land Management, US Forest Service, and others, specializes in biocontrol of invasive/noxious weeds and rearing and providing insect “agents” to help control and manage targeted weeds.

At the center located in Lapwai, Idaho, biocontrol agents are reared in controlled weed gardens and greenhouses. Biocontrol agent nurseries have been established throughout the region at invasive weed sites where the weed is being controlled, which also provides for agent collection by biocontrol staff for redistribution to weed sites where agents are not yet established. The biocontrol staff provides a wide range of services such as assisting landowners and managers develop a weed management strategy, including inventorying your weed problem to determine if biocontrol agents are already present.

Informational workshops are conducted every summer at the center and at strategic points throughout the Pacific Northwest. Workshops generally begin in May and continue through August in correlation with biocontrol insect emergence and mating activity taking place on targeted weeds. The focus of workshops have been on yellow starthistle, spotted knapweed, Dalmatian toadflax, leafy spurge, and a host of other weeds creating problems throughout the region.

A typical workshop begins with a presentation outlining the history, structure, and function of the biological control of weeds and methodology of collecting, releasing, and monitoring biocontrol agents. The indoor presentations last for a couple of hours, then after a break for lunch, the group heads to the field to actually collect biocontrol insects, and learn more about them and how to best utilize them.

Participants take home a biocontrol agent that is pre-collect plus what they collect in the field.

For more information, contact Paul Brusven at 208-843-9374 or pbrusven@nezperce.org, or visit www.nezpercebiocontrol.com.

**A workshop participant handles the root feeding biological control agent for spotted knapweed.**

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**PAUL BRUSVEN**

is coordinator of the Nez Perce Bio-control Center in Lapwai, Idaho. He can be reached at 208-843-9374 or pbrusven@nezperce.org.

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Invasive Plants on the Westside
continued from page 17
mostly spreads from stems dumped with yard waste and it is very tough to control once it gets established. Often, people report having many acres of woods covered with it before they even realize what is going on.

The last, but definitely not least, forest invader to mention here is garlic mustard. This edible European plant, already a widespread problem in the Eastern U.S., has been on the high priority hit list for both Oregon and Washington for a number of years, but has evaded efforts to eradicate it. Garlic mustard is a tricky plant to identify and tends to spread to new areas undetected until already well established. A single plant doesn’t look very threatening, but garlic mustard is a prolific seeder and grows very densely and quickly, covering large areas of forest quite quickly and out-competing native vegetation. The tiny seeds are easily spread to new areas by wildlife, water, equipment, and people. All woodland owners should become familiar with this plant and keep on the lookout for it. Because there are so many look-a-likes in our forests, it’s best to get expert help to identify garlic mustard or send photos to your local weed program or extension office.

Our westside woodlands are such wonderful places for plants to grow, it is not surprising that there are so many invasive plants showing up in them. However, if we watch for the worst invaders and work together to respond quickly to new infestations, we can keep them at bay. Even in places where the weeds have already gotten a foothold, the sooner we control them, the more the forest will benefit in the generations to come.

SASHA SHAW is an education specialist with the King County Noxious Weed Control Program in Seattle, Wash. She can be reached at 206-477-4824 or sasha.shaw@kingcounty.gov.

Online Noxious Weed Resources
Oregon Department of Agriculture Noxious Weed Program: www.oregon.gov/ODA/PLANT/WEEDS/
Washington State Noxious Weed Control Board: www.nwcb.wa.gov/
Pacific Northwest Weed Management Handbook: pnwhandbooks.org/weed
Oregon State University Extension Service Publications (search for weeds): extension.oregonstate.edu/catalog
County noxious weed program websites, such as King County Noxious Weed Program website: www.kingcounty.gov/weeds

Garlic mustard can spread from a single plant to cover an entire hillside in a very short time.

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Sherwood, OR 97140
email: aks@aks-eng.com
website: www.aks-eng.com
CALL Keith Jehnke or Alex Hurley
The feral swine population in Oregon is growing. Although hard to pin down, Oregon Department of Fish and Wildlife (ODFW) Invasive Species Coordinator Rick Boatner estimates it is between 1,000 and 5,000.

Feral swine, also called wild pigs or wild boars, have been reported in 17 counties in Oregon, but are concentrated in the central and southwest regions of the state. Enormously destructive, they can rip through a hillside, field, or stream bank overnight. Less obvious is the damage they inflict on native wildlife through depredation and disease.

To help combat the problem and protect native habitats and species, the Oregon, Washington, and Idaho Invasive Species Councils have launched a campaign called Squeal on Pigs and set up a hotline for reporting feral swine sightings.

How to Squeal on Pigs:

• If you see feral swine or feral swine damage, call 888-268-9219 or your local Department of Fish and Wildlife office.

• If you have feral swine on your property, report it to ODFW immediately—it is the law. In Oregon, download a copy of the publication Feral Swine Menace Oregon for information on your reporting responsibility at www.dfw.state.or.us/conervationstrategy/invasive_species/feral_swine.asp.

“It’s a battle we have to win,” said Boatner. “We have only to look at states like Texas and California to see the millions of dollars they spend every year to try and manage the negative effects of feral swine.”

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You can help by using and burning only locally cut or heat-treated firewood. Visit www.dontmovefirewood.org to learn more.
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Minimize disturbance

Most weeds have evolved to quickly take advantage of disturbed sites—such as those that are created naturally by fire or landslides or those created by management activities such as road building, timber harvesting, or firefighting. Any effort that reduces forest disturbance or quickly restores disturbed sites to native vegetation should incrementally reduce weed invasion. Some amount of disturbance is often unavoidable or even desirable (e.g., when building roads or preparing a site for natural tree seeding), but generally try to do only the amount of disturbance needed to meet the objective.

Identifying and controlling weeds

If weeds have become established, try to control them as soon as possible. Weed populations are easier to control if the problem is small. Permanent removal is very inexpensive at 1/100 of an acre and becomes expensive quickly as the area infested rises above 100 acres. Controlling roadside weeds in particular also helps prevent them from moving to other forests.

Is that plant native? New weeds continue to be introduced to Northwest forests. Cycles in weather, climate, and disturbance create good conditions for weed establishment in our forests. The first step in preventing the spread of weeds once they are present is being able to recognize plants that do not belong. A number of good publications with color photos can be useful in this regard. There are also some helpful smartphone/tablet applications (e.g., “1,000 Broadleaf Weeds of North America,” an android app).

Biological controls. Biological controls, where they are available, can be an important part of efforts to manage invasive weed species. For more information, see the article by Paul Brusven on page 20 in this issue, and consult with your local weed authorities to see what is available in your area.

Hand pulling. Hand pulling can be used, usually in conjunction with herbicide application, to control annual weeds in areas smaller than 1/100 of an acre. Wear gloves when pulling weeds. Some plants have chemicals in their tissues that can be absorbed through human skin and negatively affect our health. When pulling weeds, it is important to get the whole plant. Pulling is easiest when soils are moist.

Livestock. Livestock can move weeds by passing seeds through their digestion system, typically within 2 to 5 days. However, carefully managed livestock can be a tool to help manage weeds. For example, goats are used in the steep canyons of Idaho’s Snake River to control weedy species such as yellow starthistle. Goats are also used for leafy spurge, spotted knapweed, and Himalayan blackberry.

Mechanical and cultural controls. Weeds can sometimes be controlled mechanically with hand tools such as hoes or agricultural equipment like cultivators. Large equipment is often impractical in forest situations because of the terrain; however, some large flail-like grinders mounted on skid steers can quickly remove some woody species.

Herbicides. Herbicides are effective tools and when used properly are safe for people and other animals. When
considering herbicides, it is critical to correctly identify the plant to be controlled and to use herbicides known to control the weedy species while minimizing damage to desired plant species. One of the best resources for evaluating herbicide options is the PNW Weed Control Handbook, available online at http://pnwhandbooks.org/weed. The manual is revised annually by the three Northwest land grant university extension programs. Dozens of other extension publications are available to help you identify and control specific weeds. Always read and follow all label directions when using any herbicide.

**Continue monitoring.** Most weeds put out lots of seed. Many weed species’ seeds can remain viable for many years. A one-time control effort is insufficient to control weeds. Monitor treatment areas and apply additional treatment as needed.

**Restore native vegetation.** Once weeds have been removed, re-establishing native vegetation often helps reduce weed re-establishment. Since most weed species are not very tolerant of shade, establishing tree cover also suppresses weeds. Usually, the native vegetation will establish on its own. Extreme conditions like a very hot fire may require reseeding initially until other native species establish.

**Conclusion**

Most forest landowners value biological diversity. Weeds reduce biodiversity and a growing number of weedy plants could become established in Northwest forests’ evolving climate. For more information on weeds that are of the greatest concern in your locality, and proven strategies to deal with them, check with your local extension office or county weed department.

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**References**


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**CHRIS SCHNEPF** is a University of Idaho Area Extension educator—Forestry for Boundary, Bonner, Kootenai, and Benewah counties, located in Coeur d’Alene, Idaho. He can be reached at 208-446-1680 or cschnepf@uidaho.edu. **TIM PRATHER** is a weed ecologist for the University of Idaho Extension in Moscow. He can be reached at 208-885-8146 or tprather@uidaho.edu.
TreeSmarts: Answers to Your Tax Planning Questions

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 Buckley 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.

Following are varied questions sent in by landowners. Although there is not enough space to answer each question thoroughly, I can at least offer some key points to consider as a starting place. Hopefully there is something for everyone to take note of.

Q: A portion of our tree farm has become overly restricted due to regulatory matters, but it has value as real estate due to its waterfront location. I would like to develop and sell this portion and reinvest in more timberland. For tax purposes, how should I do this?

A: This is a concept that is not uncommon these days, and if done incorrectly will have severe tax impacts. Real estate development and tree farming should be kept as separate as possible. This means the development should take place inside a completely separate entity, and the operations of the tree farm and the new development entity should not intertwine. Of course very minimal development is not necessarily a threat, but broader activity can quickly cause you to lose several very favorable tax advantages.

First, those actively engaged in real estate development are termed a “dealer.” A dealer in real estate is not entitled to use IRC §1031, commonly referred to as a tax free exchange, which allows taxpayers to trade like-kind property while deferring tax. This is a valuable tool for tree farms as they continually look for ways to manage their age classes, species mix, or geographic location. Second, a comingling of farming and development can jeopardize the ability to take advantage of very favorable long-term capital gains rates (currently 15% for most taxpayers), either by use of IRC §631 on log/timber sales or when simply selling land outright (dealers pay ordinary rates).

Q: What is the correct way of handling meal expenses? Is there a difference for client meals vs. my meals?

A: Generally there is no difference, but this seemingly benign question becomes confusing very quickly. For example, consider such things as a holiday party, paying per diem to a consultant, or offering your clients a gift basket. In general, the amount allowable as a deduction for meal and entertainment (M&E) expenses is limited to 50%, but there are exceptions. A few of these are expenses that: a) are considered de minimis fringe benefit; b) are treated as compensation; and c) are for items offered to the general public, all of which can be fully deducted. Also, to be deductible at all, the cost must be either: a) directly related to the active conduct of business; or b) occur before or after a discussion associated with the business.

Q: What can I do as a small forest landowner to ensure that the IRS classifies my timberland as a business as opposed to a hobby?

A: It is a “facts and circumstances” test, meaning you need to demonstrate that there is: a) a clear business intent with b) a reasonable expectation of profit. This first item can be accomplished by doing some or all of the following: use a business entity, hold yourself out as a business (e.g. letterhead, signage, website), keep minutes of annual meetings, maintain a separate bank account, keep a proper set of accounting books, and do not mix personal and business finances. These are just a few examples, and none of them individually determinative. The second item, expectation of profit, is unique for tree farms, which have a long year operating cycle. The IRS normally begins to get concerned about a business when there are 4 or 5 straight years of losses, but this standard can normally be argued as not being applicable to tree farming. In addition to simply making this argument, a management plan and budgets/forecasts can certainly support the eventual expectation of profit.

Q: My wife and I are interested in beginning to shift ownership in our forestland to ensure that the IRS classifies my timberland as a business as opposed to a hobby.

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Q: My wife and I are interested in beginning to shift ownership in our
Putting in place a gifting plan is an excellent alternative. Each spouse can gift to each child/grandchild up to $14,000 in 2014 without incurring a gift tax filing requirement. Therefore, assuming the couple has three children and four grandchildren, they could gift $196,000 a year (7 x 2 = 14 gifts at $14,000 each). However, the value of the ownership units is likely going to be less than a straight percentage of the total fair market value (FMV) of the tree farm. The IRS generally recognizes that discounts often apply to reflect compromised conditions of ownership. For example, a lack of control discount is often applied. This concept refers to a unit that does not allow the owner to control any part of the business. This type of ownership is worth less than a unit that does allow control.

For our example, assume the units were valued at 70% of the FMV of the tree farm, and the FMV was $2,500,000. Our couple could gift 11% of the farm each year ($2,5MM x 70% = $1.75MM, and $196,000 ÷ $1.75MM = 11%), or over 40% in four years.

As a side note, I recommend filing a gift tax return even though one is not required for gifts under $14,000. By filing a return, the 3-year period the IRS has to audit and contest any part of the valuation and gifting begins to expire. Without filing a return it remains open indefinitely.

Q: When can I deduct road expenses?
A: At one end of the extreme is repair and maintenance, which is deducted immediately. Examples include light top dressings and clearing overhang. The cost of building spur or harvest roads (a road built to provide access for a harvest and abandoned after replanting) is charged to expense as the volume is harvested. However, mainline roads (roads intended to serve the farm for an extended period) are a different matter. The method that will get the least complaint from the IRS involves capitalizing some portion—say 30%—to the land account and never deducting it until the land is sold. The balance is amortized over a 15-year period.

Beyond these basic concepts, there are many scenarios that can leave one scratching their head. For example, what if you were required to make a minimal shift in road placement? Generally I would recommend expensing that. But how large does the “shift” need to be before you need to capitalize? When in doubt, I recommend explaining the details to your tax advisor and asking for advice.
DEAR TREEMAN, Is it true that if you pick up a skunk by the tail he can’t squirt you? I was always told that they have to have their feet on the ground in order to make a stink.

—Mark

DEAR MARK, My condolences, and a pox on the guy who misinformed you. This malodorous misinformation might have been avoided had you heeded the words of Edgar Allen Poe: Believe half of what you see and none of what you hear.

Skunks are members of the mephitidae family. Historically, some incorrectly classified skunks as mustelids (the weasel family), although the only weasel in this communique is the one who precipitated you writing this letter. Skunks are famous for their noxious spray that is produced by two internal glands located around the anus. The thick, volatile, oily liquid obtains its pungency from sulfur-based thiols contained in the oil and can be detected up to a mile away.

Fortunately, skunks do not like their odor, thus their stinker-trigger is engaged only when frightened or threatened. And while on the subject, we can eradicate another myth:

Skunks do not need to have their tail raised to do damage, although the extended appendage is a likely harbinger of things to come! The primary reason for the perpendicular tail is one of accuracy and distance as they can spray over 10 feet and with great precision.

Yet another myth to dispel: skunks are not one-and-done squirters: they can shoot in multiplicity, dependent on the volume of the “shot,” up to eight times. And this begs the question: who the devil stuck around to record eight stinks coming out a skunk’s rear-end? All of this information should precipitate us to amend the axiom about close only counting in horseshoes, hand grenades, and skunks.

Worst case scenario: you’ve fallen victim to Mark’s bruit and need a hygienic cleansing. There are myriad home remedies, and like most home remedies, vastly overrated in terms of efficacy. Tomato juice? Wrong, but a great source of vitamin C. How about lemon juice? Wrong again, although those antioxidants are a good thing. Vinegar? Nope. And you will catch more flies with honey? Avon Skin So Soft? The concern here is odor, not succulent skin. Feminine hygiene products? Just a simple “no.” Beer? No, but if used in excess will the victim truly care?

The only remedy containing any discernible evidence of success is a combination of hydrogen peroxide, baking soda, and dishwashing soap. There are a number of commercial products available containing various amounts of these ingredients. SMELLEZE Skunk Spray Odor Eliminator comes in a powder. DoggiCLEEN Skunk Spray comes in a liquid, but likely works on humans. And there’s Nature’s Miracle: Skunk Odor Remover (contains water, isopropyl alcohol, nature’s enzymes, natural citrus scent). Personally, my favorite was ANTI-ICKY-GOO Remove the Pooh (comes in a gel). Never mind: we made that one up.

Utilizing Larry’s technique, suppose we were comparing a 36” culvert to a 24” culvert. Converting to feet (Larry recommends using feet vs. inches to simplify the math) 36 ÷ 24 gives 1.5. If you are determining the volume of water passing through the culvert, 1.5 would be the multiplicity, thus will proceed immediately to the hydrologists perusing this publication.
Washington’s Family Forests: Unique, Sustainable, Local will be the theme of this year’s Washington Farm Forestry Association annual meeting. The meeting will be held in Bellingham, at the Lakeway Inn Best Western Plus on May 15-17.

Friday’s program will highlight René Ancinas, president and CEO of Port Blakely Companies, a fourth-generation family-owned business that owns and operates working forests in Washington, Oregon, and New Zealand and log exporting company Pacific Lumber and Shipping. Ancinas joined the company in 2005 as a succession candidate for the role of CEO and assumed the role in July 2010. Prior to joining Port Blakely, he was founding member and first president of the Eddy Family Council, where Ancinas led a five-year effort to establish a sustainable family business governance structure.

Also featured at our morning session will be WFFA Executive Director Elaine Oneil, sharing the direction for the association “to expand the reach of the members of WFFA into the wider community and build the bridges that demonstrate our significant contribution to a sustainable future.” Additional speakers and vendors, the Washington Tree Farmer of the Year Luncheon and WFFA business meeting will fill out the day’s events.

On Saturday a tree farmer educational event at the multi-generational Westergreen Family Tree Farms near Sumas will be held. A variety of forest management subjects will be viewed and discussed, along with options for bird watching and special activities planned for the youth.

For registration information, visit www.wafarmforestry.com.

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