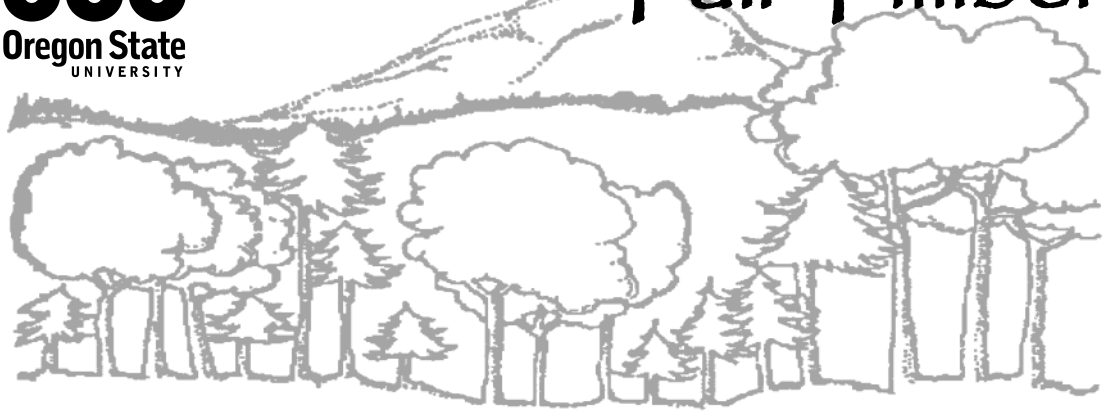
OSU Oregon State University

Tall Timber Topics

A newsletter for those interested in Forestry, Woodland Management and Christmas Trees in Northwest Oregon

Spring 2015



Tall Timber Topics Reader Survey Results

Thank you to everyone who completed our reader survey included in the last issue. We received 130 responses and appreciate all of your feedback. I thought I'd use this space to share a few of the findings.

Readers find *Tall Timber Topics* very useful, with 65% reporting that they read the whole thing cover-to-cover! Articles about weeds, insects and diseases, and general woodland management are the most useful to our readers. 74% said that the management of your woodland has been influenced by something you read in here.

We received a number of ideas for topics that we could cover. Common suggestions included forest management responses to climate change; interviews with experienced forest landowners and loggers; Christmas tree management; and alternative or nontraditional forest products. Look for articles addressing these topics in this and future editions.

Nearly one-third of the respondents have not attended an OSU Extension program in the last five years. This information is valuable to me as it reinforces the importance of this newsletter as part of the services that we provide to the thousands of woodland owners in the three-county area, not all of whom are able to show up to field days and workshops.

Beginning this issue, most of you are receiving *Tall Timber Topics* via email instead of in the mail. Thanks for your patience as we transition to this new system. One reader questioned our move to email: *"Isn't paper made from wood - a renewable resource - and isn't this forestry newsletter to benefit people growing trees to produce an income? Seems rather strange that you would be advocating something that uses less wood products."* Let me address this question. It is a matter of cost. It costs about $1.00 to print and mail each copy of the newsletter. Most of that dollar is the printing and mailing cost, with only a few cents in the cost of the paper. Since OSU Extension is funded by your tax dollars, I try to reduce unnecessary expenditures to make the best use of my limited budget. Rest assured that we will continue to mail a paper version of *Tall Timber Topics* to anyone who requests it. Just call Vicki at 503-397-3462 to be put back on the hard-copy mailing list if that is your preference.

I hope you continue to find *Tall Timber Topics* useful and informative. **Look for a very exciting announcement on page 3!**

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Upcoming Events

Women Owning Woodlands Network (Polk/Marion/Yamhill)- Walk in the Woods
Saturday, April 18th, 11:00 am (1:00 pm potluck and discussion)
Take a walk in the woods at WOWNet member Sarah's property (1300+ acres with 40% hardwood and 60% conifer) and see the small sawmill where they process local hardwood into lumber and flooring. RSVP: Tiffany Fegel, WOWNet Coordinator, tiffany.fegel@oregonstate.edu.

Yamhill County Small Woodlands Association– April program
Wednesday, April 22nd, 6:30 pm social hour/7:00 pm program
2050 NE Lafayette Ave, McMinnville
Speaker: Consulting forester Dan Upton will discuss forestry practices in Chile

Washington County Small Woodlands Association - April program
Tuesday, April 28th, 7:00 pm, North Plains Fire Station
Speaker: OSU Professor Emeritus Dr. Barbara Bond, PhD, will discuss the inner workings of Douglas-fir and what she and her colleagues have discovered about our state tree over the past few decades.

Oregon Woodland Cooperative- Annual Meeting
Saturday, May 2nd, 9:00 am – 2:00 pm (potluck lunch), Chuck Price Tree Farm near Gaston
Tour and Discussion: How to add value to your tree farm. All are welcome; bring a potluck dish to share.
For more info: Neil Schroeder, OWC President, neilschroeder11@gmail.com

Women Owning Woodlands Network (Columbia/Washington)- Walk in the Woods
Saturday, May 2nd, 11:00 am (1:00 pm potluck and discussion)
Take a walk in the woods at WOWNet member Linda's property (16 acres that were clear cut in 2001), learn about her restoration efforts and battle against scotch broom, and enjoy the wildflowers!
RSVP: Tiffany Fegel, WOWNet Coordinator, tiffany.fegel@oregonstate.edu

Columbia County Small Woodlands Association - Dinner meeting
Saturday, May 16th, 5:30 pm, Natal Grange
Speaker: Jim James, Oregon Small Woodlands Association Executive Director

Washington County Small Woodlands Association– Annual Potluck
Tuesday, May 19th, 5:30pm, Tualatin River Farm (south of Hillsboro)
Discussion: There will be a presentation on the highlights of the OSU Extension Forestry Tour in Chile. Bring a dish to share.

Yamhill County Small Woodlands Association– Annual Banquet
Wednesday, May 27th, 6:00 pm, Yan's Restaurant, McMinnville
Speaker: Ed Kamholz, co-author of *The Oregon-American Lumber Company: Ain't No More* will speak about the important role logging railroads played in the socialization of NW Oregon. RSVP required; Cost TBD.

Columbia County Small Woodlands Association/OSU Extension Summer Woodland Tour
SAVE THE DATE: Saturday, July 25th (Details TBA)

Washington County Small Woodlands Association– Tree Farmer of the Year Tour
SAVE THE DATE: Saturday, August 15th, North Plains (Details TBA)

A New OSU College of Forestry Research and Demonstration Forest in Washington County

By Amy Grotta, OSU Forestry & Natural Resources Extension and Stephen Fitzgerald, Director of the College of Forestry Research Forests & Extension Silviculture Specialist

College of Forestry Research Forests Staff and Extension Faculty getting acquainted with the new Rubie Matteson Demonstration Forest.

It is with great excitement that we can announce that the **Rubie P. Matteson Demonstration Forest** has been established as the newest parcel of the OSU Research Forests. The 180-acre tract, located near the west shore of Hagg Lake near Gaston, will be managed as a working forest, providing income to the College of Forestry, access to the public, and a multitude of Extension, education and demonstration opportunities.

The Oregon State University College of Forestry is extremely honored and grateful to be the new owner of this forest. Marion C. Matteson, a lifelong resident of the Scoggins Valley area, bequeathed the property to the College. Mr. Matteson passed away in December 2013 at age 94. Rubie P. Matteson, for whom the Demonstration Forest is named, was Marion Matteson's mother.

The Research & Demonstration Forests are a very important part of the College of Forestry. Together they encompass over 14,000 acres of forest land across the state, the largest being the 11,000-acre McDonald/Dunn Forests just on the north edge of Corvallis. They provide a range of teaching and research opportunities where various contemporary and new forest management methods are demonstrated. While the tracts closer to campus are used heavily by undergraduate classes and graduate and faculty researchers; smaller satellite tracts such as the Oberteuffer Forest in NE Oregon are more commonly used for demonstration and Extension activities. All of the lands are actively managed to maintain health, productivity, and provide income to the College of Forestry. In turn, these funds support new teaching and research initiatives within the College.

The Matteson Forest has great potential for Extension Forestry & Natural Resources programs in the local area. It is easily accessible and centrally located with respect to the private woodland owner population in Washington, Yamhill and Columbia Counties. It contains a range of stand types and ages and will serve to demonstrate how small forest parcels can be actively managed to provide income while sustaining other non-timber values over time. OSU Research Forest staff will assume most of the responsibility for management, while OSU Extension will help guide outreach activities, including tours, hands-on classes, and demonstration projects. As with all of the College's forests, the property will be open to the public for non-motorized walk-in recreation, including hikers, runners, horseback riding, and mountain bikes on designated trails and roads.

A view to the east from the main road through the property. The hills in the background are across Hagg Lake.

There is much work to be done to make the property more usable for management, year-round access, and public enjoyment. Some of the first tasks on the list include rocking and improving the main road system; creating a small parking area; and installing signage and gates. A comprehensive management plan and forest inventory will also be needed. We will soon be engaging woodland owners and other local stakeholders to determine how the forest can provide the greatest benefit for education, outreach and applied research. Look for regular updates on these and other activities at the Rubie Matteson Demonstration Forest in the future.

Management by Objective

By Brad Withrow-Robinson, OSU Forestry & Natural Resources Extension (Benton, Linn, and Polk Counties)

Adapted from TreeTopics, http://blogs.oregonstate.edu/treetopics, February 10, 2015

A local meeting of professional foresters last month focused on how forest management practices reflect the objectives of the owners. That sometimes creates challenges for the managers, since owner and manager are often not synonymous when it comes to forests and other natural resource lands. Some objectives and corresponding management practices are very well defined and developed, and others much less so.

For example, lands managed for stockholders and other investors are often planted as even aged stands on fairly short rotations, since it is an efficient way to manage risk and provide a return on investment while also providing some additional benefits to society. There is good understanding and a pretty straight line between those objectives and managers activities, both of which have remained reasonably steady over time. Their management practices have been developed through applied research, so these managers are generally quite successful in meeting their objectives.

Anyone reading the news in Oregon realizes that managers of public lands (both State and Federal) often have not benefited from a clear or consistent message of owner objectives. Public lands management objectives tend to be broad if not poorly defined or even contradictory and have often shifted dramatically over the years. The owners (who are of course the public: a fickle group at best and unlikely to change) wants various things including jobs for vibrant local economies and pristine wild habitats. Resources and funding for these agencies are often very limited. So public managers use a bunch of different management systems including long rotations and uneven age management, hoping to obtain some desired results on the cheap, but since there is little agreement on objectives, it is pretty hard to say how successful they are.

An intensively managed young stand

A mature stand on state lands

Family forest landowners often look to the larger private and public landowners for examples of management practices to apply to their lands. You can easily find folks shadowing the large private managers' planting, spacing and weed control practices, although I commonly find people planning to extend the rotation lengths on their property. And you can find people wanting to grow mature forest structures more reminiscent of Federal lands practices. This approach of management by mimicry can be problematic for family forest landowners. Why? Their stakeholder group (the owners and their family) is very different from large private or public stakeholders, as are the economics and cash flow patterns on small properties (erratic at best). So family landowners' objectives are rarely the same as those of the big private or public landowners they look to for ideas.

Standard silvicultural approaches used by professional foresters are often not well matched to the family landowners' situation, and should be adopted with caution and modifications. For example, many intensive management practices used on private lands are helpful to landowners struggling with invasive weeds and needing to re-establish a forest stand. But these practices often lead to conditions that are not as visually appealing to many family landowners as what they desire. (*Continued on page 5*)

Management by Objective *(continued from page 4)*

Likewise, habitat-oriented harvest approaches such as patch cuts can provide income without visual heartburn, but without further actions may not deliver the desired mature forest structures that were inspired by the family camping trips in old growth on the national forest.

Both of these examples' limitations can be addressed: by early thinning in the first case; by patch size, species selection and thinning in the second case. But both require some additional understanding of tree growth behaviors, actions and investment beyond the observations that inspired the action. The challenge is to be sure these practices can reflect the landowner's objectives, can fit together coherently over decades and match the local biological and physical processes.

Now I realize that family forest landowners are a very diverse group of people, and one which certainly cannot be accused of having a collective and clearly defined group of management objectives. Probably each of the thousands of private landowners in Oregon (and members within the same family) have a unique take on why they own forestland, and what benefits they want from their woods. This is one reason you see such a variety of woodland practices and so much woodland diversity across private family forestlands, often in contrast to other categories of ownership. It certainly makes my job fun and interesting.

If you are a family landowner you can make efforts to make sure you and your family's objectives for owning and tending your property are clear. Clear objectives help achieve clear results. And I do not mean to imply that you cannot look at and copy other landowners' actions. But you do need to make sure they will lead towards your objectives for your property, and be willing to learn and make necessary adjustments to keep on track.

For help and information on developing clear objectives for your property, visit the Oregon Forest Planning Website and walk through the steps of Woodland Discovery.

Acknowledgements: Thanks to the Marys Peak Chapter of the Society of American Foresters for organizing the conference "Silviculture by Objectives: Options and Outcomes" held in Albany. Thanks also to the speakers from OSU, BLM, FS and the other speakers representing various ownership types for their presentations which helped spur the observations and reflections above. BW-R.

MWM Marilyn Richen and Dog Gucci Win Truffle Hunting Competition

By Brandy Saffell, Education Program Assistant, OSU Forestry & Natural Resources Extension

Part I: Gucci and the Joriad

OSU Master Woodland Manager Marilyn Richen and her family own forest land in Columbia County. Her story about Gucci, her yellow lab, and the Joriad Truffle Hunting Competition is a modern day retelling of The Ugly Duckling.

Gucci was born into a training program for Guide Dogs for the Blind. Sadly, Gucci could not stay in the Guide Dog program because of scavenging behaviors (i.e. seeking out and nabbing food). The upside of this otherwise disappointing situation was that Marilyn and her partner, Tammy Jackson, could officially adopt Gucci. They decided, though, that they desperately needed to find some sort of activity or training to help focus Gucci's excessive energy.

This is where truffles enter the tale. Truffles are fungi that develop underground in symbiotic association with the roots of trees; they are also a culinary delicacy. Marilyn has had an interest in truffles for many years and has attended several truffle classes including those offered by the OSU Extension Tree School and the Oregon Woodland Cooperative. She was also aware of truffle hunting with dogs but did not have a dog to train until Gucci came along. Could truffle hunting be a way to channel Gucci's energy into something productive?

Marilyn Richen's dog, Gucci, on a forest truffle hunt (Photo: Jeannine May)

In 2013, Marilyn, Tammy, and Gucci began working with a truffle dog trainer, Jeannine May. The training regime involved weekly practice with Jeannine and then daily reinforcement of the skills that she taught.

(*Continued on page 6*)

Truffle Hunting *(continued from page 5)*

Gucci found her first truffle in the wild in January 2014 and was finding them regularly by the end of the truffle season (roughly December through February). This past season, Gucci went out truffle hunting once or twice per week, gradually improving her ability to identify truffles and dig them up. The time had come to put Gucci's sniffer to the test against other dogs.

Marilyn and Tammy entered Gucci in the Joriad, a North American Truffle Dog Competition event. Gucci passed with flying colors in the qualifying rounds, which took place in an arena filled with hidden truffle-scented objects. She proceeded with five other competitors to the final field round: a foggy, dense Christmas tree farm near Eugene. Each contender embarked on their own in the woods, searching for as many wild truffles as they could find in one hour. Gucci won, and although the results were not made public, she was rumored to have found more than twice the number of truffles than the second runner-up. Our champion, Gucci, had undergone her transformation from the storybook ugly duckling into a truffle-hunting swan.

(Above) Gucci and Marilyn in a qualifying round of the Joriad Truffle Dog Competition (Photo: Jeannine May); (Right) Oregon white truffles (Photo: Francis Storr)

Part II: Opportunities for Landowners

When I consider this story about Gucci, I see an opportunity for landowners to embrace truffles as a non-timber forest product. Truffle hunting has been a tradition in southern Europe for centuries and truffles remain a highly esteemed product up there with foie gras and caviar. Although there are thousands of truffle varieties, the most widely known and prized are French black perigords and Italian whites. The market value of European black and white truffles can be anywhere from $1,000 to $3,000 per pound. In the U.S., truffles grow especially well in the mild climate of the Pacific Northwest, primarily west of the Cascades. Oregon has its own native black and white truffles and peak production is found in dense, coastal Douglas-fir stands, around 15 to 25 years old. Despite the fact that these stands are common throughout our region, only a small percentage of the potential truffle crop is harvested each year (about 13,500 pounds). Part of the reason is that most commercially productive truffle habitat is on privately owned lands, but more importantly, the truffle market in Oregon is largely undeveloped.

In recent years, Oregon black and white truffles have been valued at around $320 and $220 per pound, respectively; much lower than their European relatives. Poor quality control has been suggested as one factor in the lower value of Oregon truffles. A large proportion of our truffles are harvested by raking the surface of the forest floor to uncover the hidden crop. Raking typically unearths immature truffles, which lack the savory taste that develops with ripeness. In turn, Oregon truffles have earned a bad name as less potent than European varieties.

Marilyn has found both black and white truffles on her 450 acres, but only a few ounces here and there. "For now, it's a hobby," she says. But she and Tammy see the potential for profit from truffling in Oregon, which is still a very young science. They excitedly share with me that they have found truffles far outside peak season and sometimes even in atypical forest habitat. "This is where training dogs can be useful," says Tammy. They only find mature truffles (so there is inherent quality control) and will tell you what is out there on your property throughout the year.

So what are some options for landowners to explore? You can look into training your own dog and explore the potential of your property. You could also lease your property to truffle hunters and take a share of the profits or agree upon a flat fee. Consider using a harvest permit and products sale document with your hunters. Another interesting possibility is hosting truffle forays, which are high-end events where a small group will pay to be led on a truffle hunt with dogs on the property followed by a chef curated, truffle-themed dinner. You can also look into cultivating truffles, a process that requires heavy investment but can potentially yield large quantities. For more information about Oregon truffles and other non-timber forest products: http://ntfpinfo.us/publications/index.html.

Use Caution with Spring Tree Release

By Amy Grotta, OSU Forestry & Natural Resources Extension (Columbia, Washington & Yamhill Counties)

Adapted from TreeTopics, http://blogs.oregonstate.edu/treetopics, March 12, 2015

A local landowner contacted me this winter, concerned about his ten acres of young trees and whether they had been damaged by herbicides. In May 2014, a year after the trees were planted, grass was coming in thick, so he hired a contractor to do a release spray. We don't know what the exact spray mixture was, but the landowner thought it may have been a formulation of glyphosate such as Accord. Glyphosate is known to damage Douglas-fir seedlings (and many other conifers) during the active growing season – the time from when buds begin to swell in spring until resting buds are formed and hardened off in fall.

Affected trees showed several symptoms characteristic of herbicide damage. The least affected trees simply had stunted growth. On many others, the leader and branch tips were droopy and dead. Some seedlings were completely dead.

(Left) Dead tips (upper branch) and stunted growth (lower branch). Photo taken in Jan 2015, 8 months after herbicide was applied.
(Middle) Lower branches were killed while upper branches and leader exhibit poor growth in previous season. Notice the grass re-growing around the seedling.
(Right) Herbicide damage from a different site for comparison (Photo: Dave Shaw)

But the contractor knew the risks, and had attempted to protect the trees. According to the landowner, he had covered each seedling with a section of PVC pipe before spraying around it. This is a common practice which many people assume is sufficient to protect desired plants from spray. Unfortunately, it doesn't always work. The outside of the pipe (or bucket, or whatever barrier is used) ends up getting drenched in herbicide as the applicator sprays around it. Then, when the pipe is lifted off, the solution drips off all over the plant it was supposed to protect. There seemed to be a pattern where the lower branch tips on many seedlings were the most affected, so it looks like this could be what happened.

So the symptoms are consistent with damage from herbicides, but can we pinpoint them as the culprit? Many months had passed since the spray occurred, making it impossible to detect any residual chemical. We'd have to rule out other possibilities.

Could it be freeze damage? Tender new growth in spring is sensitive to freezing temperatures, and the symptoms from frost damage and herbicide exposure look very similar. But the planting site was not one that would be typically considered frost prone, such as a low-lying area. Instead, the site was mid-slope. Did we have any unusually cold weather last spring? Records from a nearby weather station showed that temperatures were nowhere close to freezing in May 2014. So, we ruled out frost damage and concluded that unintended herbicide contact was the most likely cause.

This unfortunate situation leaves the landowner with several challenges. First, it's not clear whether the residual stocking is adequate to meet the landowner's goals, or to meet Forest Practice standards for that matter. The trees that were not killed should recover, but they lost a crucial year of growth in their race against competing vegetation. And, as the photo shows, the grass is growing back around the seedlings. The landowner may need to consider a repeat herbicide application, this time selecting a chemical that is safe around growing conifers, or that effectively controls weeds in early spring (before bud break).

So what are the lessons learned here?

- Keep records of all herbicide applications – the chemical(s) and surfactants used, spray rate, and date. Ask contractors to provide that information to you.
- Read the herbicide label. Pay close attention to what it says about safe application timing.
- Be cognizant of the seasonal growth stage of both desired plants and target plants. This year, many broadleaf species – including common weeds – are leafing out early due to unseasonably warm weather. Douglas-fir budburst is already underway in some areas too. To be safe, check your trees, not the calendar, for spring flush.
- Don't assume that a physical barrier protects seedlings from herbicide exposure.

Inviting Insects to Eat Aphids

By Chal Landgren, Christmas Tree Specialist, OSU Forestry & Natural Resources Extension

Aphids on Christmas trees, I'm told, are quite tasty to a wide range of insect predators and parasitoids (Figure 1). But making sure that dinner and diner are in-sync is "complicated". You want to make sure your timing is right on and your investment and time are used well. In this short article my hope is to provide some observations on an aphid bio-control trial conducted this past summer. We are not just pushing bio-control, but certainly are trying to move beyond the old mindset that each and every year you spray for "bugs" on June 5 and again 4 weeks later with the cheapest broad spectrum insecticide out there.

First, let me offer some observations from our efforts this past summer to control aphids with insect releases. The project was funded by Clackamas County Extension Innovation Grant funds. We used nine Christmas tree grower sites with different combinations of the following:

- *Aphidoletes aphydimyza* (predatory midge). Target release was 10,000/ac. Midges arrived as larva and were released as adults within days of hatching.
- *Aphidius matricariae* (small parasitic wasp) Target release was 2000/ac. Initial release of adults was 400/ac. then 600/ac then 1,000 ac.
- *Chrysoperla rufilabris* (green lacewing). Target release was 5,000 eggs/ac. Released as eggs on sticky cards spread around fields (Figure 2).
- Methyl salicylate, a common plant-produced odor, and available as a commercial lure (Predalure™). We distributed 15 Predalure™ tabs/ac.

Figure 1. A damaging level of aphids on Nobile fir

Releases were conducted in three stages beginning the 1st week of May, mid May and concluding the first week in June. Fields were inspected every 2 weeks and all observed predators were tallied. What did we find? First, we found that 2014 was a "low" year for aphids. But we did observe the following:

- Ladybugs and hoverflies turned out to be the most common aphid predator identified. Neither were part of our releases.
- Lacewings were released and were the third most commonly observed beneficial.
- Mummies from *Aphidius* wasp activity were never observed and *Aphidoletes* midge predators were rare. Both are tiny and hard to ID.
- We had 3 sites where aphid populations increased during the summer. At each of these, the natural enemies observed increased as well and no insecticide spraying was needed.

Figure 2. Lacewing eggs in tree tabs

At all the sites, we found a host of other beneficial bugs (pirate, damsel, stilt) predatory mirids, soldier beetles in addition to ladybugs and hoverflies. Our next step will be to investigate what growers can do to encourage these beneficial bugs to hang around our trees.

Tent Caterpillars Emerging Now

By Amy Grotta, OSU Forestry & Natural Resources Extension (Columbia, Washington & Yamhill Counties)

Columbia County had a tremendous outbreak of western tent caterpillars last year, primarily within ten miles of Rainier and a couple of pockets in the south County. The adults dispersed widely. Like many things this spring, the caterpillars are emerging ahead of schedule. Local reports and some from the Portland area and Washington State indicate that the eggs have hatched and young caterpillars are active as of the first week of April. Chip Bubl (Columbia County Ag Extension Agent) has seen egg masses and tiny caterpillars around Scappoose and St. Helens. On the other hand, no egg masses or caterpillars were seen on a site near Clatskanie that was at the heart of the 2014 outbreak.

The early emergence of the tent caterpillars is due to the warm weather we experienced these past couple of months. These very hungry caterpillars feed on many deciduous trees. They particularly like fruit trees, and they completely defoliate alder stands. How will the timing of the egg hatch match up with their preferred foods? It remains to be seen. Our best guess is that the Rainier outbreak peaked last year, while south Columbia County may be harder hit this year. Since alder is just starting to leaf out, might the caterpillars run out of food before the green wave of alder? These are just speculations…we will have to wait and see what nature brings.

If tracking seasonal events like these (called phenology) interests you, you might consider becoming an Oregon Season Tracker. Your observations could be used by many to help understand changes in our environment. Learn more at http://oregonseasontracker.forestry.oregonstate.edu/.

New and Revised Publications

Common Insect Pests and Diseases of Sitka spruce on the Oregon coast (EC 1129)
By J. Reeb and D. Shaw. New January 2015, 23 pages. Free download at:
https://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/54962/EM9105.pdf

Alternative Forest Management App
Free download at: https://catalog.extension.oregonstate.edu/series2

Guidance for Conserving Oregon's Native Turtle Including Best Management Practices
By Oregon Department of Fish and Wildlife. Free download at:
http://www.dfw.state.or.us/wildlife/living_with/docs/ODFW_Turtle_BMPs_March_2015.pdf

2015 Pacific Northwest Insect Management Handbook
Editor: C. Hollingsworth. Free download at: https://catalog.extension.oregonstate.edu/insect

2015 Pacific Northwest Plant Disease Management Handbook
Editors: J. Pscheidt, and C. Ocamb. Free download at: https://catalog.extension.oregonstate.edu/plant

Land Measurement and Survey: An Introduction for Woodland Owners (PNW 581)
Revised. Free download at: https://catalog.extension.oregonstate.edu/pnw581

2015 PNW Weed Management Handbook
Revised. Free download at: https://catalog.extension.oregonstate.edu/weed

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