

WINTER 2023

Prescribed Fire and Pyrogenic Carbon

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Consider building a portable water
delivery system!

Regional News

Central & South Central Oregon

Northeast Oregon

Baker, Grant, & Southeast Oregon

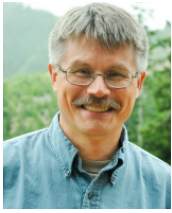
Life on the Dry Side

Serving land managers and owners east of the Cascades



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Life on the Dry Side

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OSU FORESTRY & NATURAL RESOURCES NEWSLETTER

Serving land managers and owners east of the Cascades

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Cover Photo: Kenneth E. Gibson, USDA Forest Service, Bugwood.org.



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Log Market Report

Data courtesy John Lindberg (Oregon Log Market Report), supplemented by John Punches

Since our November edition log values have slipped a bit in almost all our markets. Douglas-fir is down about \$40 per MBF across the board, but still holding decent value at \$460 to \$540 depending on the mill. Grand/white fir values were less predictable, dropping \$55 per MBF in the Pendleton area but holding steady in John Day/Burns, with other mills tracking in between those extremes. Lodgepole pine and Engelmann spruce showed mixed results but price changes were generally minimal. Ponderosa pine tended to have fairly stable values for small diameter material but price drops for larger material. I wish I could point you to better news for ponderosa pine, but it's still a relatively low value species in our markets. It does appear that the Gilchrist mill is buying larger pine again, so if you're in that area a call to your log buyer for details might be in order.

Pulp values in the Columbia River Gorge dropped a bit, from \$48 per ton to \$42 per ton for both pine and Douglas-fir. There's rumor that local pulp demand in northeastern Oregon, which had been reasonably strong, has declined due to changes in mill product lines. While we don't have great pulp prices in most markets it's always advisable to see if you can get small material to market at a cost less than that for treating it as slash. I think that's particularly true of pine slash, which can be an attractant for the pine engraver (Ips) beetle if not treated in a timely manner. Remember that Ips beetles love to infest, and build up their populations in, the same size pine that goes to the pulp mill. Spending a bit to get that small pine hauled away may be a good investment in the health of your larger leave trees, as those trees' tops could otherwise be targets for Ips.

LOG MARKET REPORT \$/1,000 board feet (or ton)						February 15, 2023		
Umatilla/Pendleton/Boardman								
Douglas-fir/Larch	Ponderosa Pine				Grand/White Fir	Lodgepole Pine	Engelmann Spruce	Pulp/Chip Logs (ton)
460					420	285	285	42 pine, 42 d-fir
La Grande/Elgin								
Douglas-fir/Larch	Ponderosa Pine				Grand/White Fir	Lodgepole Pine	Engelmann Spruce	Pulp/Chip Logs (ton)
	6-7"	8"+						
500 – 525	260 - 270	280 - 300			400 - 425	300 - 320	300 - 320	
Pilot Rock								
Douglas-fir/Larch	Ponderosa Pine				Grand/White Fir	Lodgepole Pine	Engelmann Spruce	Pulp/Chip Logs (ton)
	10-11"	12"+	16"+					
	350	400	420					
Burns/John Day								
Douglas-fir/Larch	Ponderosa Pine				Grand/White Fir	Lodgepole Pine	Engelmann Spruce	Pulp/Chip Logs (ton)
	6-7"	8-11"	12-17"	18"+				
360	120	250	290	375	240			
Redmond/Bend/Gilcrist								
Douglas-fir/Larch	Ponderosa Pine				Grand/White Fir	Lodgepole Pine	Engelmann Spruce	Pulp/Chip Logs (ton)
	8-11"	12-16"	17"+					
		360	425					
Lakeview/Klamath Falls								
Douglas-fir/Larch	Ponderosa Pine				Grand/White Fir	Lodgepole Pine	Engelmann Spruce	Pulp/Chip Logs (ton)
	6-11"	12-16"	17"+					
	290	320	360		8"+ 340	8"+ 320		
Lewiston ID								
Douglas-fir/Larch	Ponderosa Pine				Grand/White Fir	Lodgepole Pine	Engelmann Spruce	Pulp/Chip Logs (ton)
540					525	500	500	

In this Edition

We're super pleased to feature two articles in this edition from Drs. Tom DeLuca and Jeff Hatten. Tom is the Dean of OSU's College of Forestry and Jeff is Head of OSU's Department of Forest Engineering, Resources and Management. Both are accomplished forest soils scientists who are deeply committed to OSU's Extension mission. When we asked them to contribute articles to Life on the Dry Side they readily consented. We hope you'll enjoy their thoughts on pyrogenic carbon (charcoal in layman's terms) and forest soil health. We eastside Extension folks count ourselves fortunate to have these committed leaders supporting us. Thanks Tom and Jeff!



Dr. Tom DeLuca, Dean of the College of Forestry, with his pal Benny the Beaver.



Dr. Jeff Hatten, Department Head, Forest Engineering, Resources and Management, in his native environment.



At the 2022 Annual SageCon Summit, attendees worked in mixed stakeholder groups to practice applying principles for strategic conservation in the sagebrush ecosystem. Credit: Katie Wollstein

BAKER, GRANT, & SOUTHEAST OREGON NEWS

By Jacob Putney, Extension Forester in Baker and Grant Co., and Katie Wollstein, Rangeland Fire Regional Specialist

SAVE THE DATE! TREE SCHOOL EAST RETURNS JUNE 2023

After a long hiatus, following the unfortunate cancellation of the event in 2020, we are excited to announce that Tree School East is finally returning in 2023! Mark your calendars and plan to join us all day on Friday, June 30th at Baker High School in Baker City, Oregon.

Tree School is a one-day mini-college featuring classes on a wide variety of forestry and natural resource-related topics. This huge event also includes demonstrations, exhibitors, and vendors, as well as an opportunity to meet and interact with numerous forestry-minded folks. Started in Clackamas County more than 30 years ago, Tree School is a core event within the OSU Forestry & Natural Resources Extension Program and has grown to include regional offerings across the State.

Traditionally held every two years, alternating host locations between Baker City and La Grande, Tree School East will offer something for everyone, including small woodland owners, foresters, natural resource professionals, loggers, contractors, teachers, and the public.

Planning is well underway and there are many more details to come! Watch for the program and registration details this spring. In the meantime, if you have questions or are interested in being involved, volunteering, and/or offering an exhibit, booth, or display, please contact Jacob Putney (541-523-6418; jacob.putney@oregonstate.edu).



HOW DO WE WORK TOGETHER AT A SCALE THAT MATTERS?

It is difficult for individual landowners, managers, and organizations to prioritize and coordinate their activities to address threats to ecosystem resilience. On Oregon rangelands, these threats are largely invading annual grasses and frequent, large wildfires. Management plans and funding opportunities often yield short-term or piecemeal projects that do not necessarily translate to landscape-scale outcomes. How do we work together so our activities are coordinated, strategic, and support resilience?

The Eastern Oregon Agricultural Research Center and partners have been relentlessly focused on this question. We identified a need for conceptual tools to organize (and leverage) multiple entities' activities to support resilience on large landscapes. We developed programming using a strategic planning framework for influencing the

occurrence and outcomes of wildfires and, in so doing, rangeland resilience. Last November, we hosted a workshop at the SageCon Annual Summit where over 80 participants became acquainted with principles for strategic landscape-scale planning. Participants worked in mixed-stakeholder groups and practiced applying concepts for defending and growing core rangelands and prioritizing.

I know it is hard for individuals and organizations to coordinate, given the mixed ownerships that underlie much of eastern Oregon where there is a diversity of values, management objectives, and abilities to act. ***Yet rangeland resilience benefits everyone; we must act collectively to create and maintain it.*** How do your activities influence fire outcomes in your community?

(See photo, page 4)

Prescribed Fire and Pyrogenic Carbon

PyC's important role in forest soils

By Thomas H. DeLuca, Professor and Dean, OSU College of Forestry

Pyrogenic carbon (PyC, or charcoal) is a highly stable form of ecosystem carbon that forms when biomass, including wood, shrubs, grass and other organic matter, burns incompletely. Once deposited in soil PyC is a very stable form of carbon that influences a range of processes, as a result of its high degree of porosity (see *Figure 1 below*) and capacity to adsorb nutrients and organic compounds. It is those same characteristics that result in us using PyC or charcoal in our daily lives for reducing odors, clarifying water, protecting against wood decay, and, of course, in the back yard barbeque.

PyC IN WESTERN FORESTS

PyC was historically a common component in western forest soils. For example, low elevation, seasonally dry forest ecosystems of the Western US, including ponderosa pine (*Pinus ponderosa*) and dry pine/Douglas-fir (*Pseudotsuga menszesii*) forests historically burned on fire return intervals of 7 – 50 years, while higher elevation forests such as lodgepole pine (*Pinus contorta*) burned on a broader interval of 80 – 160 years. A varied amount of PyC would have been produced during each fire event and accumulated in soils over time. Historically, fire frequency on the landscape was directly influenced by indigenous use of fire as a natural system for food production and community protection. A combination of forest management activities (followed by cessation of management), fire exclusion, and active fire suppression have led to the accumulation of live and dead fuels in

western forest ecosystems but have reduced the rate at which PyC is deposited during fire events. Reintroduction of fire as part of fuel reduction treatments reduces the potential for high severity fires that combust surface soil organic matter while adding PyC to the soil environment.

Grasslands and prairies of the western US also experienced recurrent fire on a short return interval. However, agricultural development eliminated fire from these systems, with the exception of occasional burning of crop residues.

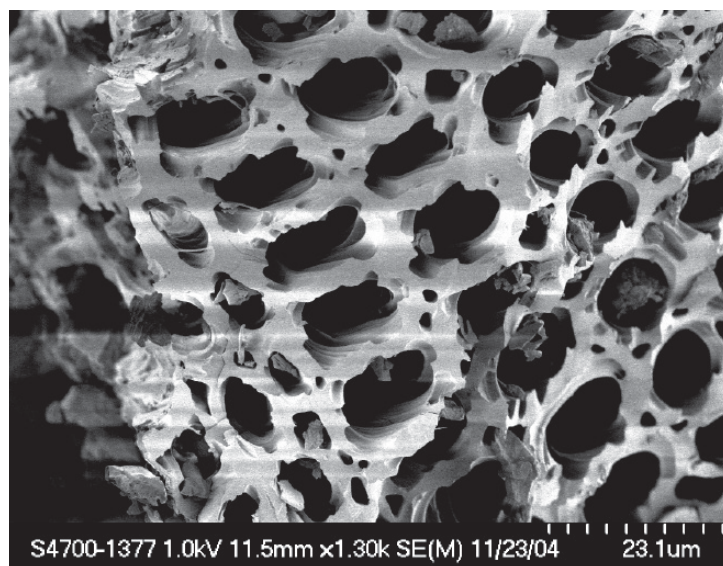


Figure 1. Electron micrograph of naturally produced ponderosa pine PyC demonstrating its porous nature and high surface area, making it ideal for adsorbing water as well as organic compounds (photo credit: Rachel Brimmer).

Let's take a brief look at how PyC is formed during fire events, the role of prescribed fire in adding PyC to forest soils, and the value and function of PyC in the soil environment.

FORMATION OF PyC DURING FIRE EVENTS

Historical wildfire events generated a significant amount of PyC, a portion of which was subsequently buried in surface mineral soil or lost to erosion. Several colleagues and I did an extensive review of existing literature that quantified PyC production during fire events and we found that wildfires converted 1 to 9% of biomass exposed to fire to PyC, and on average produced just over 1 ton of PyC per acre (DeLuca et al. 2020), (see Figure 2). Results from the Fire and Fire Surrogates study at Lubrecht Experimental Forest in western Montana showed that prescribed fire after thinning operations deposited approximately just under 1 ton of PyC per acre in surface soils, whereas burn alone (patchy and limited woody fuel consumption) yielded a bit under ¼ ton of PyC per acre (DeLuca et al., 2020).

Other studies from elsewhere around the US suggest that Rx fires produce about 0.7 tons of PyC per acre in a single event (DeLuca et al. 2020). The production of PyC is clearly related to a combination of how much fuel is exposed to fire and the severity of the fire, with increasing fuel loading generally increasing the PyC production. Reports from boreal fire events with heavy fuel loading have been shown to produce PyC at a rate of about 2.1 tons per acre, and globally it is estimated that between 127 and 422 million tons of PyC are produced annually (Santin et al. 2016). Given the stability of PyC in mineral soils, this is a significant addition of stable carbon to western forest soils.

FIRE, PyC AND FOREST SOIL HEALTH

Wildfires and prescribed fires influence soil properties and processes by consuming or converting organic matter from the O horizon (the layer of decaying matter that accumulates above the mineral soil), limited consumption of organic matter in surface mineral soils, and by causing the conversion of biomass to PyC. Fires thereby add both biologically active carbon (through mortality of plants and animals) as well as highly stable carbon to soil organic matter, sediments, and aquatic systems. This rapid formation of PyC during fire events sidesteps the tortuous



Pyrogenic carbon (PyC) is formed by the incomplete combustion of organic materials. Photo: John Punches.

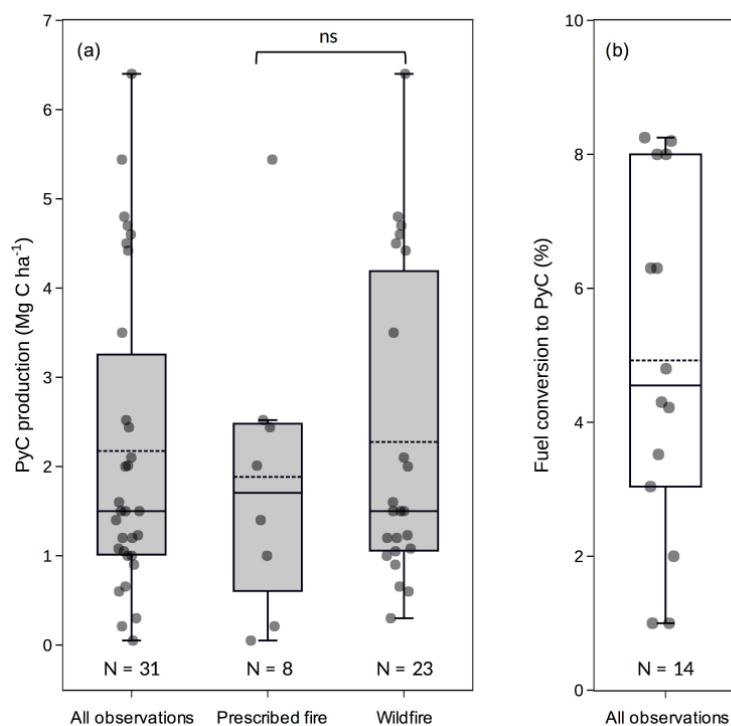


Figure 2. Total PyC production during wildfire and prescribed fire events in the western US (panel a) and rate of biomass conversion to PyC (%) during fire events (adapted from DeLuca et al. 2020). Note that 1 Mg/ha is equivalent to about 0.45 US tons/acre.

pathway by which stable organic matter forms in mineral soils independent of fire (See Figure 3 below).

PyC is a general term given to organic materials that have been subject to pyrolysis or partial combustion under oxygen-deprived conditions during biomass burning events (Santin et al. 2016). Once deposited in soil, PyC may remain intact for hundreds to thousands of years (DeLuca and Aplet 2008). Due to its longevity, PyC has been identified as being an important carbon storage mechanism (DeLuca and Aplet 2008; Santin et al. 2016). PyC has the capacity to influence soil physical, chemical, and biotic properties and to alter soil nutrient availability and nutrient cycling (DeLuca et al. 2015). Given the porous nature of PyC it is understandable that its addition to surface mineral soil increases soil water holding capacity (Gao and DeLuca 2020).

PyC is generally nitrogen poor but can be relatively rich in alkaline metals (e.g., Ca, Mg, K) because the high temperatures required for volatilization of alkaline metals results in their residual accumulation in ash affiliated with the PyC. The alkalinity associated with these materials creates elevated pH within the PyC zone of influence. The

elevated pH, along with the porous nature of PyC and the influence on soil physical structure, creates hotspots for soil biotic processes in the post-fire soil environment. The ability of PyC to adsorb organic compounds may reduce adverse impacts (e.g., allelopathic effects) of invasive species or enhance plant-microorganism signaling necessary in the establishment of mycorrhizal infections or root nodule formation in legumes and actinorhizal species (Pingree and DeLuca 2017).

Studies with activated carbon as a proxy for PyC have demonstrated increased growth in Scots pine (*Pinus sylvestris*) and poplar (*Populus* spp.) seedling growth by adsorbing and removing phenolic compounds that might otherwise inhibit germination in the soil environment. The incorporation of PyC into mineral soils have also been shown to increase nitrogen and phosphorus availability, retention and uptake across a range of ecosystems.

Although PyC can remain in soil for centuries, over time it loses some or all of its adsorptive capacity, reducing its positive effect on the soil environment. In the absence of fire PyC can be added to the soil environment through

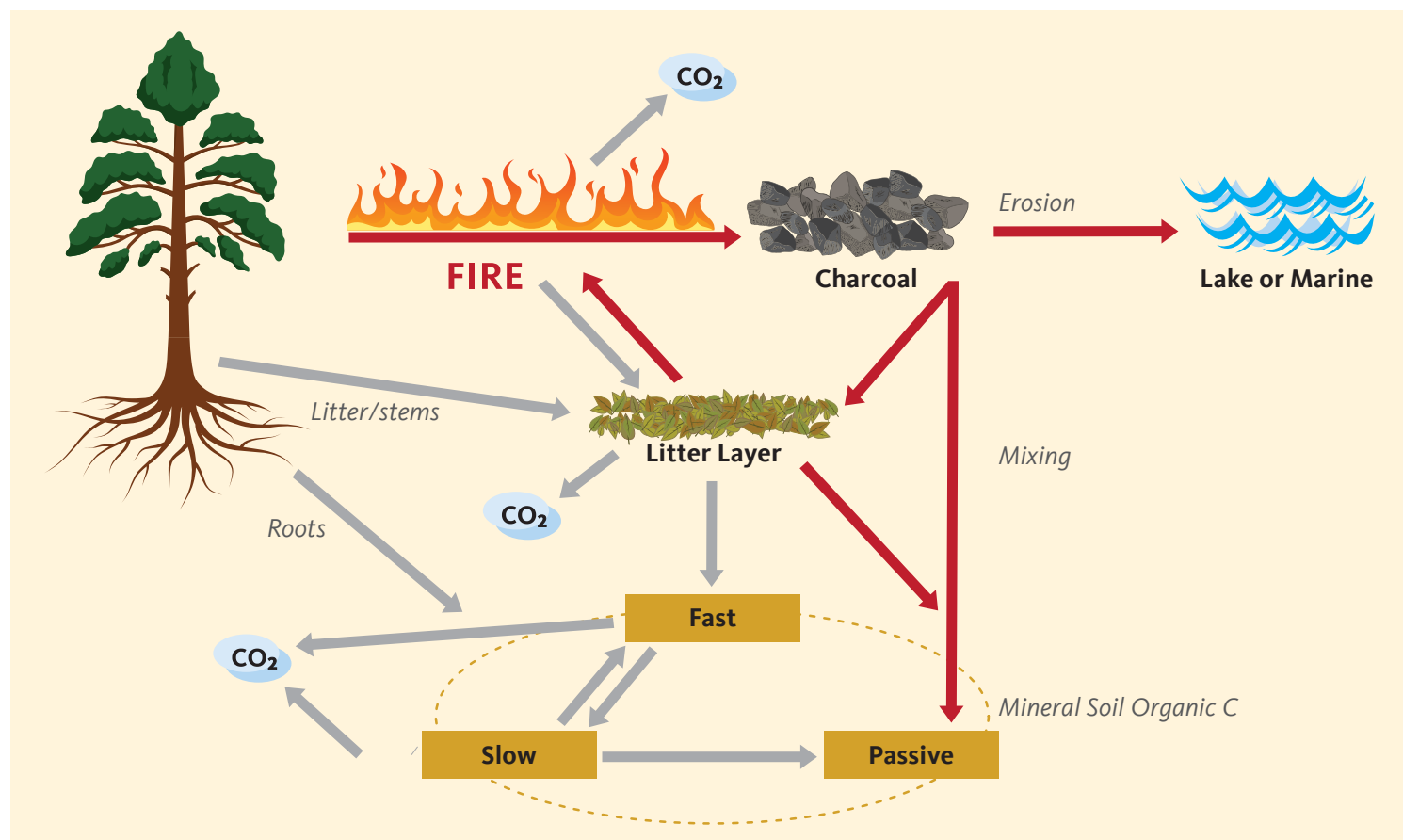


Figure 3. Contrast in formation of passive carbon through decomposition of organic matter and immediate formation of PyC or charcoal during fire events (From DeLuca and Aplet, 2008).

the application of biochar, a form of PyC explicitly generated for land application (DeLuca and Gao 2019). Although the addition of PyC to surface soils doesn't have the desirable disturbance effects associated with fire (e.g., fuel reduction and nutrient release) it can positively influence soil physical and biochemical properties.

PyC WRAP UP

PyC, or charcoal, is a naturally occurring legacy of fire events. Decades of fire exclusion have reduced the PyC input, but given the longevity of PyC in the soil environment large amounts of PyC remain in soils today, although old PyC may be less active than recently produced PyC. Reintroduction of fire as prescribed fire may deposit between 0.45 and 1.34 tons of PyC per acre. This addition of PyC to the soil environment can improve soil health through an increase in soil water holding capacity, nutrient retention, and potentially increased nutrient availability. In the absence of fire, such as on agricultural landscapes, PyC can be added to soils as biochar, but don't expect an immediate plant response, as you would when applying fertilizers. When applied to soil PyC functions like a conditioner and responses may be subtle or perhaps only experienced under stressed conditions such as extended drought.



Wildfires, and prescribed fires following thinning, produce an average of 1 ton of PyC per acre. Photo: Thomas DeLuca.

LITERATURE CITED

DeLuca, T. H., and G. H. Aplet. 2008. Charcoal and carbon storage in forest soils of the Rocky Mountain West. *Frontiers in Ecology and the Environment* 6:1-7.

DeLuca, T. H., and S. Gao. 2019. Use of Biochar in Organic Farming. Pages 25-49 in S. Chandran, C. S. Thomas, and M. R. Unni, editors. *Organic Farming: New Advances Towards Sustainable Agricultural Systems*. Springer, New York.

DeLuca, T. H., M. J. Gundale, R. J. Brimmer, and S. Gao. 2020. Pyrogenic carbon generation from fire and forest restoration treatments. *Frontiers in Forests and Global Change* 3.

DeLuca, T. H., M. J. Gundale, M. D. MacKenzie, and D. L. Jones. 2015. Bio-char effects on soil nutrient transformation. Pages 419-452 in J. Lehmann and S. Joseph, editors. *Biochar for Environmental Management: Science and Technology*. Earthscan Publications Ltd, London.

Gao, S., and T. H. DeLuca. 2020. Biochar alters nitrogen and phosphorus dynamics in a western rangeland ecosystem. *Soil Biology and Biochemistry* 148:107868.

Pingree, M. R. A., and T. H. DeLuca. 2017. Function of wildfire-deposited pyrogenic carbon in terrestrial ecosystems (Mini-Review). *Frontiers in Environmental Science* 30.

Santin, C., S. H. Doerr, E. S. Kane, C. A. Masiello, M. Ohlson, J. M. De La Rosa, C. M. Preston, and T. Dittmar. 2016. Towards a global assessment of pyrogenic carbon from vegetation fires. *Global Change Biology* 22:76-91.



PyC helps soils retain moisture and nutrients, and associated ash increases soil pH, providing benefits for plants recolonizing the burned site. Photo: Thomas DeLuca.

Managing for Soil Health

Concepts for resilient forests

By Jeff Hatten, Department Head Forest Engineering, Resources, and Management

Soils support life by providing diverse ecosystem services, including water supply and quality, biodiversity and habitat for plants and animals, recreation opportunities, carbon sequestration, and the delivery of timber and non-timber products. However, disturbances (both direct and indirect) can lead to a degradation of soils that can persist for long periods of time. Soil health is a useful way of conceptualizing the state of soils. Forest soil health can be defined as a soil's capacity to function within ecosystem and land-use boundaries to sustain plant and animal fitness, ecological biodiversity, primary productivity, and environmental quality. A precise definition of soil health is challenging because it depends on specific site conditions and the human values in that place and time.

Impacts to forest soil health can include actions such as alteration of soil physical properties (e.g., compaction and erosion) or chemical conditions (e.g., organic matter loss, acidification, nutrient loss). Additionally, we need to consider more diffuse impacts generated by human actions (e.g., changes to fire regimes, climate change, pollution, invasive species) that can stress forest soils in ways that alter or impair their ability to function.

THREATS TO FOREST SOIL HEALTH IN CENTRAL AND EASTERN OREGON

Shifts in a forest's fire regime can have major implications for the soils that support it. The term 'fire regime' refers to the typical frequency, intensity, duration, aerial extent, and seasonality of wildfire disturbance in a particular ecosystem. Fire regimes are changing with our climate across many parts of the globe, including Oregon. Some changes, so far, are subtle, while others have resulted in an increased occurrence of high severity "megafires", with these fires more intensely impacting larger areas. Contributing factors include increased fuel loads due to long-term fire suppression, extended periods of



The O horizon is the layer of partially decayed organic matter overlaying the mineral soil. This layer holds moisture and nutrients recycled from dead plant materials and is often heavily populated by trees' fine roots. Photo: Jeff Hatten.

drought, and global warming related increases in fire season. A shifting fire regime is probably the single greatest threat to our dry Oregon forests and soils.

Fire effects on soils depend on burn intensity, heat duration, and O horizon consumption. Noted fire effects include increased erosion potential, changes in post-fire soil temperature and water holding capacity following O horizon consumption, reduced soil carbon and nutrient pools, and increased soil pH. With time, available nitrogen can increase but be leached or immobilized by microbes, effectively reducing post-fire plant N supply.

Consumption of the above ground vegetation and O horizon by high severity fire exposes surface soils to rainfall impact, promoting runoff, surface erosion, and the potential for mass wasting. Furthermore, high severity fires can lead to lower infiltration rates due to the creation of hydrophobic, water-repellent, soil layers with surface sealing that can enhance surface runoff. On the other end of the spectrum are low severity fires which leave much of the soil cover intact. Erosion and nutrient losses are negligible after low to moderate severity fires.

Many of central and eastern Oregon's forest ecosystems are adapted to frequent, low to moderate severity fire. Concurrently, the soils of these ecosystems have formed and are also adapted to these levels of disturbance. Changes to the fire regime because of fire suppression and human caused climate change means that we need to consider management treatments that increase the resilience of the forest to these perturbations and preserve soil health. Forest management activities (e.g., fuel and vegetation management, return of low intensity fire, and selective harvest) that reduce high-severity fire risk can maintain and enhance forest soil health. Without such fuel reduction activities forest soil health will be at risk to the effects of high severity wildfire, particularly in fire-prone regions around the world.

HARVESTING AND MECHANICAL FUELS MANAGEMENT FOR RESILIENT FORESTS

Mechanical techniques that reduce fuels can include harvesting, thinning, and mastication. Forest harvest activities create disturbances, but with different impacts on soil that depend on harvest frequency (e.g., rotation length) and the magnitude of the biomass removal. The impact to soil health depends to a large degree on the silvicultural system utilized, which can range from gentle, single-tree selection to intensive, clear-cut harvesting - the latter potentially causing considerable disturbance to surface soils (e.g., compaction, organic matter removal) and their associated functions (e.g., water infiltration rate, nutrient supply).

On the other hand, thinning and lower intensity harvesting techniques tend to have minimal impacts to forest soils, especially when soils are protected with slash mats (*see photo page 12*). While leaving slash and an intact forest floor (O horizon) can protect the forest soils from compaction and carbon and nutrient loss – it can leave the site vulnerable to fire. Subsequently these materials can be masticated, piled and burned, or sometimes left and broadcast burned.

Prescribed burning is the process of intentionally setting fire to the forest to



High severity fires consume above ground vegetation and the O horizon, exposing surface soils to rainfall impact, promoting runoff and surface erosion, and elevating the potential for landslides, soil slumps, and other forms of mass wasting. Photo: John Punches.



High severity burns can cause significant negative impacts to forest soils - a real risk in areas that have experienced long-term fire suppression. Photo John Punches.

reduce fuels or otherwise elicit some desired response from the ecosystem.

These fires are typically set in the spring or fall when fuel moistures are high and burning conditions allow for management of the fire. These fires typically burn at low to moderate severity, with fall burns typically resulting in moderate severity fire due to low fuel moisture and spring burns typically resulting in low severity fire because of higher fuel moistures. Fall burns are more effective at reducing fuel loads than spring burns. Low severity prescribed fire typically has no detectable effect on soils (aside from consumption of the O-horizon), while moderate severity fires can result in higher soil pH and available nutrients but a slightly higher risk for erosion and leaching of nutrients.

BEST MANAGEMENT PRACTICES TO MAINTAIN SOIL HEALTH

Harvesting and site restoration efforts should focus on keeping soil in place with ground cover composed of recent harvest residues or a developed forest floor for stand renewal, development, and stability. Care should be taken to reduce compaction, maintain soil organic matter, nutrient capital, and soil moisture holding capacity to help prevent erosion losses of forest soils. Reintroducing fire into a fire suppressed landscape may result in fire severity that is too high to maintain soil health. However, a combination of thinning, pile burning, spring burns, and fall burns can be used to lower fuel accumulations and maintain soil health and increase the resilience of the forest to future disturbances.



Above: Severe compaction from a 45-year-old access or skid road. Ruts from previous activity can still be seen decades later, and while trees have re-established they are growing much slower than others in the stand. Photo Jeff Hatten.

Below: Operating equipment on a slash mat helps protect soil from disturbance and compaction but leaves behind fuels that may need later treatment. Photo John Bailey.



NORTHEAST OREGON NEWS

By John Rizza, Regional Fire Specialist

From Punches: We've been enjoying interacting with many of you through the *Restoring Oregon's Dry Side Forests* webinar series. It started in December and occurs on the first and third Wednesdays of each month, concluding April 5. The series has generated a lot of conversation, and we hope it's encouraged you to think about the complexities involved in moving dry forests toward greater resiliency. If you haven't been attending and are interested you can find details and recordings at <https://beav.es/drysiderest23>. Rizza, Jake Putney, and I are planning to hold several forest management and restoration related field tours this summer, and some prescribed fire landowner learning sessions this fall, so stay tuned for details.

The Northern Blues Restoration Partnership continues to make significant headway on fuels reduction and resiliency projects on federal, private and tribal lands. I'm pretty heavily involved in the project's monitoring team, and am pleased to share that this past spring and summer we kept our field crew busy collecting data on First Foods plant conditions, upland forest vegetation and fuels, bird counts and whiteheaded woodpecker habitat and presences, and riparian, wet meadow, and aspen conditions. Planning is underway for our upcoming monitoring season. We're still early in these projects, but I'm hoping that we'll have post treatment results to share next winter.

From Rizza: After much coordination and many hours, partners across Grant County were able to evaluate forest and vegetation conditions over 74,000 private land acres this past field season. This is across all cover types and is incorporating important work the Grant SWCD is doing related to fine fuels treatment needs on annual invasive grasses. The partnership is working directly with private landowners across the region to help them implement strategic projects in areas that align with focus areas across all land ownerships. OSU Forestry & Natural Resources Extension contributed to this work by advancing a rapid inventory and ground-based assessment protocol and data collection tool that enabled a better understanding of the current private land conditions. This has led to ongoing conversations between partners and landowners to help implement treatment actions across the landscape.

Working with landowners to discuss the current condition of their land and potential opportunities to reduce their risk is an essential effort as we support the management of these private lands. To effectively do this at scale, discussions with landowners are helping us learn more about their specific needs and barriers to accomplishing good conservation on the ground. Bringing new and innovative ideas to the conversation is accomplished by the diversity of engaged partners and landowners as the solutions to these complex landscape issues are challenging and need everyone's thoughtful engagement.



Partners from the region gathered to discuss and learn more about the efforts to assist private landowners in achieving their land management goals. Credit: Diane Carrico

This winter we have spent time analyzing the inventory data and are working to create a pathway to effectively communicate our findings back to landowners. By formulating specific treatment recommendations, we hope to assist landowners in developing action plans that meet their specific management goals during the upcoming field season.

More land will be assessed using the tool this coming summer in Grant County. Additionally, we are in the initial planning stages to implement this project across more areas in NE Oregon. Stay tuned for more information on the project and please feel free to reach out for more information.

Preparing for Wildfire

Consider building a portable water delivery system!

By John Rizza and Jacob Putney

While many fire professionals want to help you focus on implementing passive defense practices to be well prepared for wildfires, you may also want to advance your active preparedness systems. One approach could be putting together what we call a "slip tank" or "skid unit". These are portable water tanks with gas-powered pumps that can be used in firefighting situations. You may be familiar with these types of devices or have seen them on the back of wildland fire trucks or engines, however, these are typically very expensive units that are robustly designed to be used in the harshest of conditions. Recognizing that landowners might not be able to afford, or need, a custom designed and manufactured piece of equipment, we have some thoughts on building your own cost-effective skid unit using equipment that you may already have on your property.

This past year I had the opportunity to put together a simple but effective water delivery system that could easily be mounted in the back of the pickup. I secured a recycled, metal-caged Intermediate Bulk Container (IBC) tote for a reasonable price. You can typically find these used tanks for under \$100, or purchase new for under \$400, from many agricultural suppliers. You may already have a tank that can be repurposed and used but be sure to rinse the tank safely and thoroughly prior to use. These tanks typically have a valve and fitting at the bottom where a standard 2" camlock hose coupling can be attached. I made a short length of hose that connects

using another camlock on the pump side as well. Also, I found that inserting a few standard 10-foot lengths of 4" perforated pipe (similar to drainage pipe) into the large top opening of the tank works well as a baffle system while not taking up volume in the tank. This will help keep the water from sloshing around in the tank as you move around the property.

For the pump I chose a self-priming two-stage high pressure pump with a 270cc 4-stroke motor. I felt this was the best option for my setup, and at the time the price point of the pump was attractive. On the output side of the pump there is a 3-way discharge port with a 1 ½" and two 1" ports installed from the factory. Each port can be plumbed with a valve, allowing lines to be isolated and for water to be moved in multiple ways. One port has been plumbed with a valve to allow for recirculation of water back to the tank. This will prevent the pump from overheating when water is not being discharged. Opening the valve slightly allows water to flow back into the tank and will not affect the output pressure on the hose end, but it is important to find the optimal setting that will protect the pump and allow for sufficient pressure at the nozzle end.

When considering building your own unit it is important to ensure the equipment is appropriate and properly setup specifically for fire suppression. For example, an herbicide sprayer system's pump would lack the volume and pressure to work well for fire suppression activities.

There is a large difference between volume pumps, which typically do not deliver the necessary pressure to effectively attack wildland fires, thus pressure pumps are recommended.

A few suggestions for minimum specifications include:

- Pump – 20 Gallons per Minute (GPM); 120 PSI
- Tank capacity – 150 gallons, but suggest 200 gallons
- Hose – 300 feet of each 1 ½ inch and 1 inch

Select a pump that meets the minimum specifications recommended above. Just remember that the least expensive pump may not be the best option as you want something that is reliable and durable. No matter the pump you choose, ensure that it has adequate delivery pressure and GPM ratings and is well-maintained! Running good quality fuel and operating the engine and pump frequently are good ways to ensure you are prepared when the pump is needed.

Next, how you choose to set up your hose will ensure you have what you need in the event of a fire. Wildland fire hose is specific and is preferred if it is within your price range. Single jacket hose construction is lightweight and extremely durable. It is heat, abrasion, and puncture resistant, however, it is not fireproof. Compared to garden hose, it has less friction loss and allows for higher water flow over long distances, which is ideal in suppression

situations. You can also consider hooking up a shorter length of ¾" hose for keeping water available near the pump unit.

There are many ways to assemble and plumb your setup to deliver water, this is just one example that I thought might be of interest. Having access to your own fire suppression system is a great way to prepare for the upcoming fire season. However, it is not a substitute for calling trained suppression professionals. Do not engage in fire suppression unless you have been properly trained to do so and have the proper tools and personal protective equipment. Please remember to call in any ignitions to your local fire response authority and always maintain situational awareness to protect yourself and others.

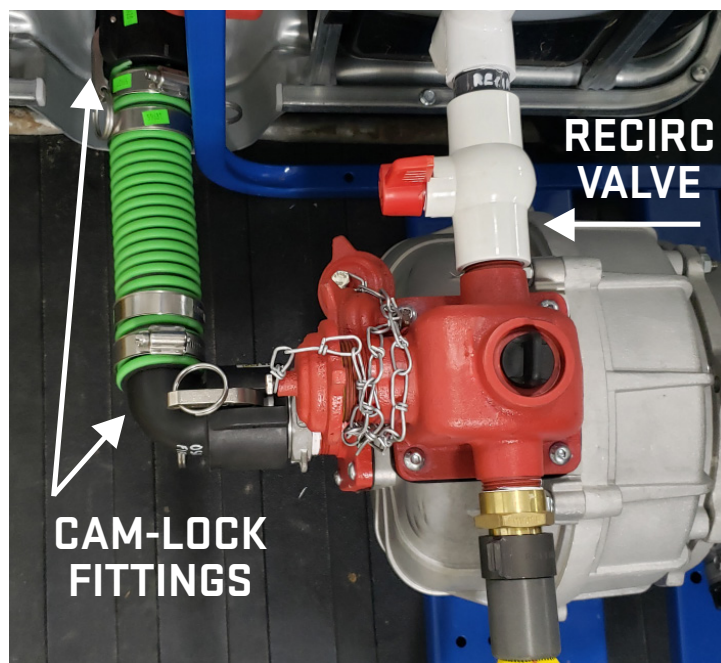
Please do not hesitate to reach out if you have questions on assembling your own suppression unit. Below is a great resource that describes specifics that were outside the scope of this article.

ADDITIONAL REFERENCE:

Garza, Nick and Charles Taylor. 2007. How to Build Cost-Effective Skid-Sprayers for Prescribed Burning. *Rangelands*. 29(2) pp.41-44. <https://repository.arizona.edu/handle/10150/639690>



Low-budget slip tank ready for use in the back of a pickup. It utilizes an IBC tote as its tank, paired with a good quality but relatively low cost high pressure pump.. Photos this page, credit: John Rizza



Tank hooked to pump using 2" cam-lock fittings. A recirculation valve, with hose piped directly into the top of the tank, is also present to ensure the pump does not overheat while running without moving water.



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CENTRAL & SOUTH CENTRAL OREGON NEWS

By Ariel Cowan, Regional Fire Specialist

This winter, the fuels reduction projects funded by Senate Bill 762's Landscape Resiliency grant will wrap up work across central Oregon. These projects required partner coordination of land stewardship and wildfire risk reduction. Partners met in the field to view the work in progress last fall. Successes and challenges experienced by each group were discussed and later captured in a survey conducted by the Ecosystem Workforce Program. This information will be pertinent to improving future grant opportunities for building landscape resiliency to wildfire across the region.

In the meantime, central Oregon is gearing up for the Spring 2023 Prescribed Fire Training Exchange (Trex). This two-week training aims to increase local capacity for safe use of prescribed fire. Planners of Trex, the C.O. Fire Prevention Coop, and local forest collaboratives are all planning media campaigns this spring to increase public awareness of prescribed fire, forest restoration, and wildfire preparedness.

In south-central Oregon, the Klamath Lake Forest Health Partnership has been getting ready for a busy 2023. The Bear Wallow Landscape Scale Restoration grant has been awarded funding from the US Forest Service. The funding will provide continued support for Good Neighbor Authority and Federal Forest Restoration projects, a collaboration facilitating Oregon Department

of Forestry work on the Fremont-Winema National Forest. This upcoming field season will include monitoring plant responses to all-lands fuel reduction and invasive plant removal projects (private, federal, and state lands). Prescribed fire is also going to be a priority this year as burn plans are being developed for interested private landowners around the North Warner and Thomas Creek areas in Lake County. Much work will also be underway continuing the removal of hazardous trees and planting seedlings in areas burned by wildfires in the last three years in both Klamath and Lake Counties.



During a Central Oregon Shared Stewardship Alliance field trip, partners observed dense stands of dying trees at La Pine State Park and discussed challenges with completing forest restoration projects in the short time frame provided by the landscape resiliency grant.