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Forest Carbon: A Primer

PHOTO COURTESY OF ELAINE ONEIL

Counting carbon stored in large woody debris can double the carbon estimate for aboveground storage in old-growth forests. Photo taken in Redwood National Park.

BY ELAINE ONEIL

Almost daily there is a new scientific article or news item that talks about carbon storage, forests, wood products, emissions, or biomass. In these articles, carbon compounds in their many forms have been referred to as pollutants, emissions, building blocks, a source of additional economic value that can be sold to offset fossil fuel emissions, a sink for greenhouse gases, an essential element to maintain soil productivity, and a source of energy. These labels reflect the diversity of our perspectives on forest carbon and our demands on the forest resource. Often there is disagreement among the reports, which means the forestry practitioner is left wondering how to separate the layers of information into usable bites relevant to their situation. The series of articles in this issue highlights some elements that will help the reader understand why there are these differences among reports and articles, and how to make sense of them for your purposes.

Why should the forester care about carbon?

The increased interest in studies on forest carbon-related themes is driven by the increasing concentration of carbon dioxide (CO_2) in the atmosphere that is largely driven by fossil fuel emissions, and to a lesser extent by loss of forest cover primarily in the tropics. Carbon sequestration in forests has been identified as one of the options for reducing CO_2 concentrations in the atmosphere. The relative magnitudes of CO_2 emissions from forest cover change and CO_2 emissions from fossil fuel combustion would indicate that we are not going to solve the fossil fuel emissions problem by growing more forests on more acres, at least here in the US.

For example, the US greenhouse gas inventory data estimated emissions from fossil fuel burning at 5,706 Tg CO_2e (terragrams of Carbon Dioxide Equivalents) in 2010, with a cumulative value of 35,376.4 Tg (35.4 billion metric tons) for the period 2005-2010. Globally, the estimate from burning fossil fuels was 30,313 Tg CO_2e for 2009. In the US, where the acreage of forests and the amount of carbon stored per acre is increasing, forests absorbed an estimated 1,088 Tg CO_2e/year (18% of average yearly US emissions) from 2005-2010. So every year, during a time when we were able to expand our forest inventories, we fall further behind by 82% of yearly fossil fuel emissions.

Adding to this context is the pressure to develop forestland for other uses, and the significant increase in widespread mortality events correlated with climate change, particularly in the western US. For example, National Interagency Fire Center (NIFC) data show that the number of acres burned/year in wildfires has nearly doubled (1.93x) since 2000 as compared to statistics for 1960-1999. Despite the relative differences in fossil fuel emissions and forest uptake in the US, forests can play a significant

(CONTINUED ON PAGE 2)

In This Issue: The Carbon Cycle and Forests—How They Are Connected

Forest Carbon: A Primer

(CONTINUED FROM FRONT PAGE)

two-fold role in mitigating CO_2e in the atmosphere via direct absorption and storage and substitution for fossil fuels, either directly or indirectly. But the accounting is complex and requires an assessment that takes in demands beyond the forest boundary.

On a relative scale, ocean algae growth trumps forest sequestration in terms of total atmospheric CO_2 absorption, largely because of the relative size of the ocean. However, forests are the most efficient terrestrial carbon accumulating system for two reasons. First is the high amount of carbon/acre that can be sequestered in forests (referred to as carbon density) relative to other types of vegetation. Second, the carbon (C) to nutrient ratio in wood is so high (on the order of 400:1 to 1,200:1 for carbon to nitrogen depending on species) that for a very small amount of nutrient input, a large amount of carbon can be stored. These factors make growing trees an ideal way to remove carbon dioxide from the atmosphere and store it in wood, which varies from 46-55% C depending on species.

PNW forests, including northern California, have some of the highest carbon densities found anywhere worldwide, where carbon density refers to the amount of carbon stored/acre. The maximum carbon density value has been reported as upward of 3,000-5,000 t/ha for 1,000-year-old redwood forests (~1200 t/acre), but not all of that is in the standing trees as it includes estimates for soil carbon and dead wood that is substantial in these forests.

In contrast to this impressive carbon density number, an analysis of 2007 Forest Inventory and Analysis data published by the USFS for the 11 western states shows a maximum plot value of 350 t/ac in California, 450 t/ac in Oregon, and 475 t/ac in Washington for the tree inventory component (including estimates for roots). The distribution of standing forest carbon is very wide with long tails. Median values are typically less than 100 t/ac as shown in the box and whiskers plot (see Figure 1), which displays the distribution of all forested inventory plots for the 11 western states. The median, third, and first quartiles are shown as the middle, top, and bottom bars of the box, respectively, with everything above the dotted line considered an outlier.

To put these carbon densities into forestry terms, newly regenerated forests or those grown on low-site quality areas store less wood and therefore less carbon. High-site areas can produce more wood and therefore carry more carbon at its maximum stocking capacity. In terms of the distribution of carbon storage across the landscape, from a forestry perspective this chart should be intuitive as there are more acres of low-site class land than high-site class land as the best bottomland growing sites have long been taken over by cities, roads, and farms. Those plots above the 95 percentile (outside the whisker) are likely the remnant old growth found in forest preserves throughout the region; those below the 95th percentile are likely newly regenerating forests. Looking at the regional distribution it also makes sense that the states with temperate climate conditions (i.e., western WA, OR, and Northern CA) have stands with high carbon density, whereas those in the dry interior west have low carbon densities because stand volume is low at maximum age and the incidence of wildfire and insect and disease out-

SOCIETY OF AMERICAN FORESTERS 1900

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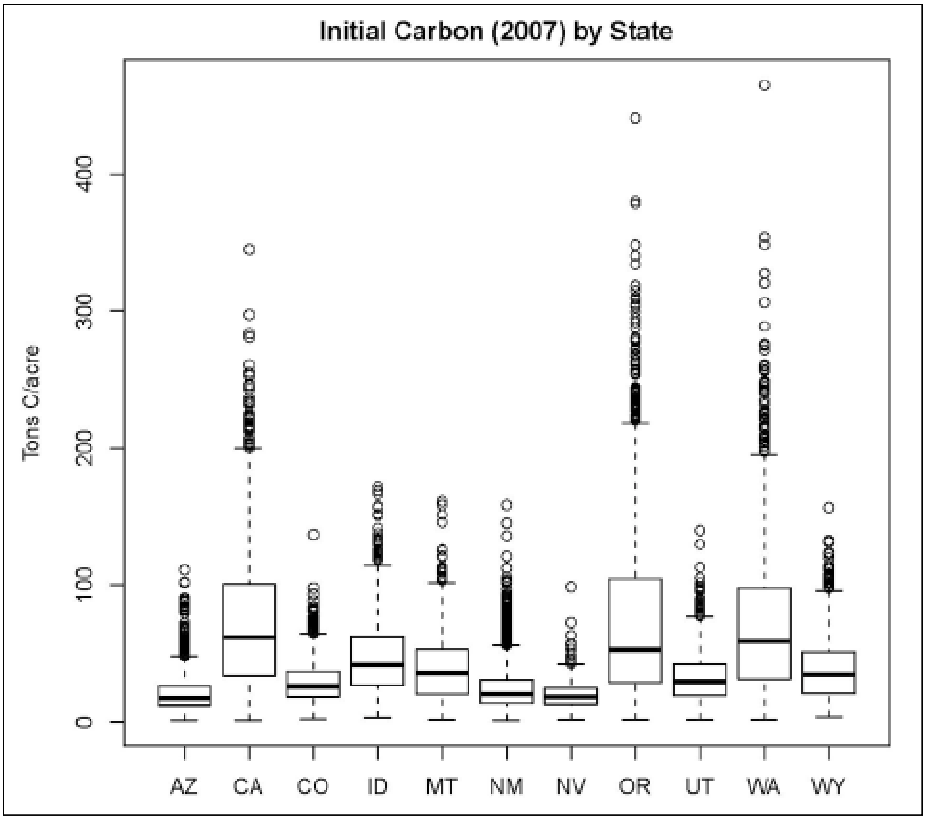
Next Issue: Non-timber Forest Products



SOURCE: ONEIL AND McCARTER, IN REVIEW

Figure 1. Standing carbon inventory for timberlands of the 11 western states derived from FIA inventory (2007 base year).

breaks prevents the accumulation of high carbon densities in forests.

Tree carbon accounting, while not easy, is at least based on a long history of research on forest measurement, growth, yield, decay, and site quality that have historically been reported using wood volume metrics such as MBF or stand characteristics such as basal area or site index. The accounting will generate divergent results when assumptions and measurement techniques vary: this is a particular issue when moving from the refined equations we have for yield of the tree bole to full tree biomass estimates that have been shown to vary by as much as 91% across equation types for PNW species. This wide uncertainty parameter is driven by the functional form of the equations.

For example, the US national biomass equations are based on an exponential function of diameter so as the diameter increases the biomass increases exponentially. This can result in substantial over estimates of large diameter trees that are outside the range of the data used to fit the equations. Sorting through these issues and making improvements is the scientist's job; for the practitioner, care must be taken to ensure that any emergent carbon trading markets, as discussed in the article herein, establish which equations they plan to use, and how they will account for this uncertainty so as to ensure that forest carbon accumulations are real, not an artefact of biomass model behavior as trees increase in size and move outside the range of the fitted data.

Moving beyond the trees into the forest adds an additional layer of complexity to the carbon accounting story because the biological interactions between the atmosphere, soil, water, and living and dead plant tissues occur at rates that vary from days and months to millennia. Not all parts of the system are well studied. Specific techniques to measure changes through time are recent and under continuous development as noted in the article on soil carbon that describes the study of deep soil carbon as an emergent area of interest.

Layered on top of that biological system is the interaction between harvesting, manufacturing, and use of wood products that can be best quantified using a sophisticated accounting framework as described in the life cycle assessment article. Examining

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forest carbon sequestration as a subunit of an accounting framework that takes into account how forests are typically managed, the products that come from them, and how they are used to substitute for functionally equivalent products with a high fossil fuel footprint, generates an enlarged picture of the whole system and how best to manage forests to reduce atmospheric CO_2.

Research has shown that the potential atmospheric reduction in CO_2e is substantially greater with high rates of substitution than for longer rotations if the wood stays in service for at least as long as the rotation. With one caveat: if we keep forests as forests. If we begin to harvest more than is grown or convert high carbon density forests to low carbon density forests, such as allowing unmanaged wildfire without reforestation or converting high carbon density old growth to low carbon density second growth grown on a short rotation, then that land-use change needs to be factored into the equation. Thus far the debate has accounted for the conversion of forests to non-forests, but not the carbon density changes within forests that might accrue with increased use of forests to meet carbon sequestration objectives.

To add another layer of complexity to forest carbon accounting, there are plenty of contentious issues in the policy, investment, and comparable accounting arena as highlighted in the policy article by Jay O'Laughlin. How these issues get resolved will, to a large degree, dictate the choices that make sense for the forestry professional. In large part those choices will be dictated by existing and future economic returns that are needed to ensure that forestland stays as forestland. Given that the largest C sequestration benefit that can effectively be managed is from tree growth, it makes sense to focus on maintaining or enhancing tree yield through careful management of nutrients, water holding capacity, stocking, and species selection. ◆

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Additional Reading

Lippke, Bruce, Elaine Oneil, Rob Harrison, Kenneth Skog, Leif Gustavsson, and Roger Sathre, 2011, *Life cycle impacts of forest management and wood utilization on carbon mitigation: knowns and unknowns*, Future Science-Carbon Management 2(3):303-333. Open access available online at soilslab.cfr.washington.edu/publications/Lippke-etal-2011.pdf.

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Life Cycle Analysis: How it Works for Forestry and Forest Products

BY MAUREEN PUETTMANN

Over the past few decades, a growing awareness that the manufacturing of any product impacts our environment has occurred, which in turn has influenced how we choose, buy, and use. Manufacturers want to understand environmental impacts not only to meet increasing environmental regulations, but to promote their products as environmentally friendly. During a product's life cycle, it requires energy to extract, produce, use, and transport. Most products, including wood products, have several life cycle stages ranging from when the resource is extracted from the earth to the time it no longer can serve any function. In terms of life cycle assessment (LCA) this is termed "cradle-to-grave" (see Figure 1). All life cycle stages require energy, which can produce a variety of emissions to air, land, or water that have very specific effects on the environment. The environmental impacts created during one process step are embodied within that product as it is transferred to another processing step. It is this systemic approach that is the basis for the LCA methodology.

Life cycle assessment is an objective process to scientifically and accurately assess the environmental burdens associated with a product at any stage during processing or through its entire life cycle. The development of the LCA methodology has helped to quantify and provide information about products where certain environmental qualities were previously lacking. An LCA is comprised of four interrelated components (see Figure 2).

These steps are interconnected and their outcomes are based on goals and objectives of a particular study. Possibly the most widely used step in any LCA is the life cycle inventory analysis (LCI). LCIs are an objective, data-based process that quantifies energy, raw material, emissions, and solid waste within the system boundaries of the study. The life cycle impact assess-

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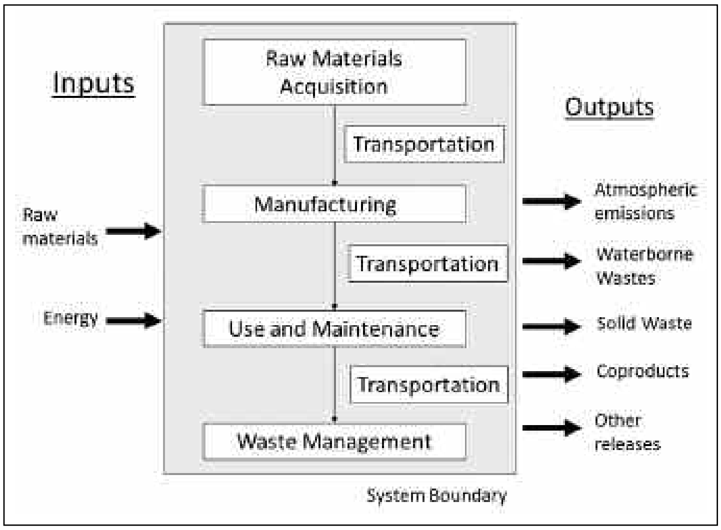

Figure 1. Cradle to grave: Input and output parameters by life cycle stages of a general product.

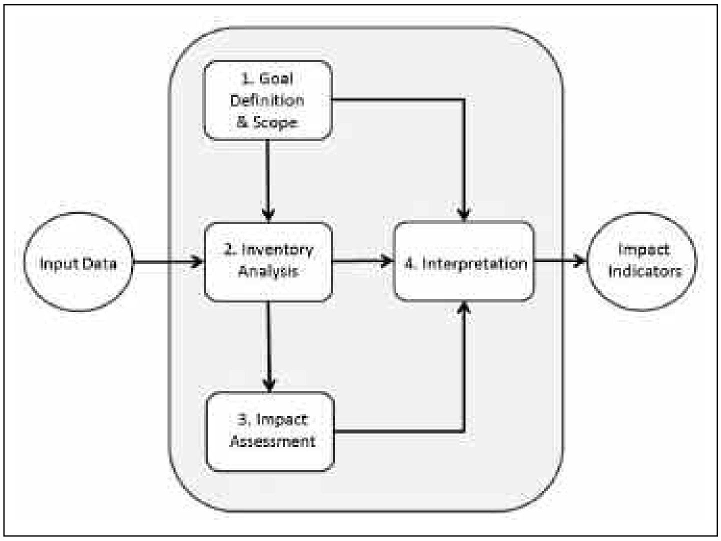

Figure 2. Steps in developing a life cycle assessment.

ment (LCIA) step uses the LCI results to assess the impacts these environmental releases and resource requirements have on the environment in categories such as global warming potential, ozone depletion, acidification, and fossil fuel use (see Table 1). More recently, the public is interested in specific product attributes. Most popular of

Table 1. Examples of Impact Categories and Attributes of Interest in Wood Products

Impact Category	Product Attributes
Fossil energy use	Renewable energy
Global warming potential	Forest carbon uptake
Acidification potential	Product carbon storage
Eutrophication potential	
Ozone depletion	
Respiratory effects	
Smog	

these are energy consumption or type of energy used in producing the product, carbon releases, or carbon stored in the products. The most widely accepted methods for conducting LCAs have been developed by International Organization for Standardization (ISO) 14000 series of standards.

What has been done?

LCAs for forestry and wood products have surfaced over the past 20 years in Europe, Canada, and the US. CORRIM (www.corrim.org) has published several LCA studies covering structural building materials, non-structural panels, and most recently, wood-based biofuels (see Table 2). Repeatedly, LCAs on wood products have shown that wood-based products and biofuels consume less fossil fuels, have lower carbon releases as measured by global warming potential, and have less embodied energy compared to non-wood alternative materials and fuels. More specifically, wood framing produces lower environmental burdens than equivalent concrete or steel construction alternatives. As we approach a wealth of information on the environmental impact of forestry and wood products, the question currently under investigation is "what is the best use of our forest in terms of

Table 2. Current CORRIM LCAs on Forest Products Produced in the Pacific Northwest, Inland West, Northeast-North Central, and Southeast regions of the US

Forestry Operations	Solid Wood Products	Engineered Wood Products	Non-Structural Products	Biofuels
PNW softwood	Softwood lumber	Oriented strand board	Medium density fiberboard	Biochemical ethanol
Inland west softwood	Hardwood lumber	Plywood	Particle board	Thermomechanical ethanol
SE softwood	Hardwood flooring	Glue-laminated beams		Bio-oil
NE-NC softwood		Laminated veneer lumber		Pellets
NE-NC hardwood		I-Joist		
NE-NC SRWC*		Engineered hardwood flooring		
Inland west forest residues				

*SRWC = short rotation wood crop (willow)

carbon benefits?"

In building design, this question is more easily seen and understood. One example is comparing the concrete component with solid wood in a wall assembly (see Figure 3). According to results published by CORRIM, a concrete wall component has the highest net carbon emissions, while solid wood components (KDStud) have a negative carbon released (carbon stored in the wood product is greater than the carbon released from cradle to gate). We can reduce the carbon impact further by using biofuels during the manufacturing process of wood products (BioDryStud, BioDryPly). These biofuels can be wood waste generated at the wood product mill or from forest residues. Depending on the product, the manufacturing stage consumes the greatest amount of energy ranging from 78 to 94 percent from extraction to mill gate. Forestry operations account for just 3-7% of the total energy consumed depending on the geographic region. Regional differences are primarily due to regeneration options (natural versus planting), herbicide and pesticide use, and/or management practices. Decreases in energy consumption over the product life will result in a decrease in carbon emissions.

In western softwood lumber mills, waste wood is used for about half of

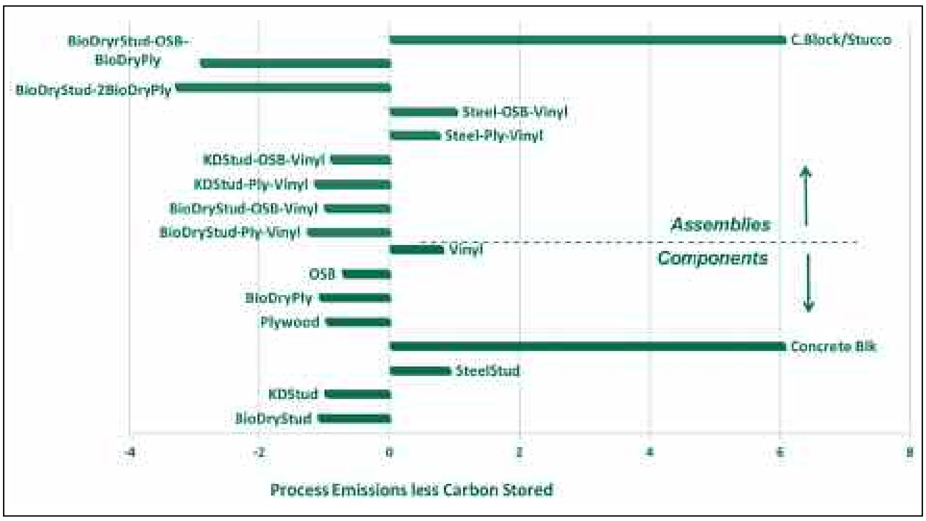

Figure 3. Net Product Carbon Emissions: Wall Structure (kgCO_2/ft^2)

the energy required for drying with the remainder coming from natural gas. With an increase interest in biofuels for heating and transportation, together with government mandates to reduce carbon impacts, researchers are taking a closer look at the use of all materials from forestry operations, including growing trees for fuel only. Substituting natural gas in the wood product manufacturing process with forest residuals decreased carbon emissions by 47%. Findings like this make the collection of forest residuals as a potential energy feedstock look attractive when carbon savings are the product attribute of interest. The usual alternative to using these residuals is to pile and burn on site where emissions are not controlled and heat energy cannot be captured.

There are numerous options for the use of woody biomass to energy, including electricity, pellet production, liquid fuels, steam generation, and direct fired heat sources. Conflicting opinions on the use of biomass for energy exist. The challenge is to use wood resources sustainably while improving our economy without adversely affecting our environment. It is important to note that carbon stored in the forest or wood products may offset fossil fuel carbon emissions for a period of time, but do not displace them. Carbon stores can only be increased by using the harvest to produce products that store carbon.

Website Resources

www.woodlifeconsulting.com

CORRIM

Puettmann et al 2010. Cradle to gate life cycle inventory of US wood products production: CORRIM Phase I and Phase II products. www.corrim.org/pubs/reports/2010/swst_vol42/15.pdf

Lippke et al. 2012. Comparing life-cycle carbon and energy impacts for biofuel, wood product, and forest management alternatives. www.corrim.org/pubs/articles/2012/FPJ_vol62_num04/02_FPJ-vol62-num04-2012.pdf

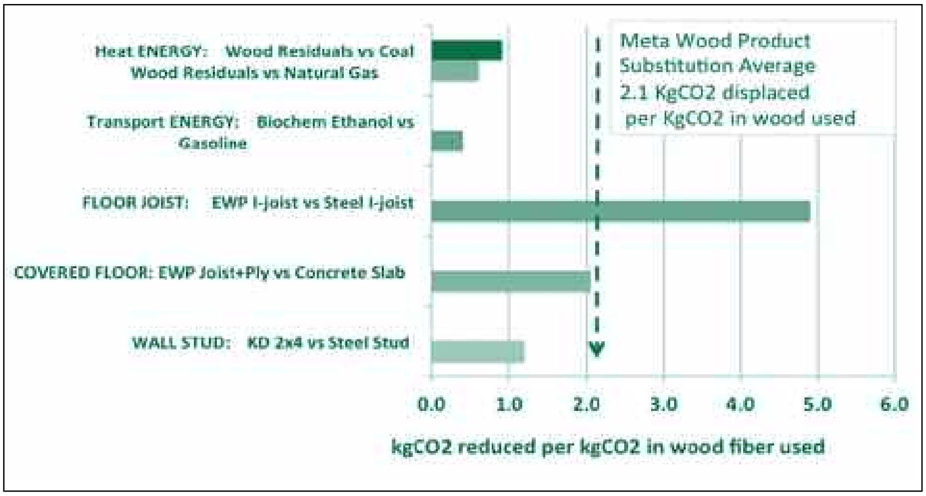

Figure 4. Carbon Emission Reduction by Displacing Non-wood Products and Fuels ($kgCO_2/kgCO_2$ in wood used)

Increasing carbon stores in existing forests that could otherwise be used for products or biofuels ultimately reduces opportunities to displace fossil emissions. Increasing the use of woody biomass as an energy fuel can reduce our need for imported fossil fuels while lowering carbon emissions.

Finding the balance between wood use and carbon emissions can be complicated. LCA studies have produced new knowledge on the use of forest resources to best off-set carbon emissions and fossil fuels use. The greatest reduction in carbon emissions can be achieved by the use of engineered wood products, such as I-joists made from oriented strand board and laminated veneer lumber instead of steel joists (see Figure 4). The substitution of wood residues for heat energy reduced carbon emissions greater than wood residues converted to transportation fuels. It is comparisons like this that make the LCA methodology useful for developing sound scientific outcomes on the true environmental impact of wood products. ◆

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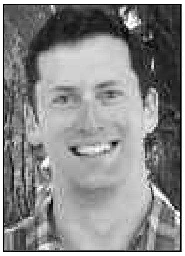
Forest Soils Store Large Amounts of Carbon

BY SCOTT M. HOLUB AND JASON N. JAMES



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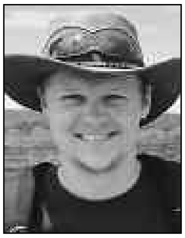


Jason N. James

Carbon in forest soils is often overlooked by the casual observer because it is less conspicuous than the live trees, downed wood, and forest floor layer that are easily visible when walking through a forest. However, the amount of carbon in forest soils to 1 m (3.3 ft) depth is generally one to two times the amount of carbon we see above ground in mature forests, making soils an important carbon pool in forest ecosystems. Although less studied, substantial quantities of carbon can also be found deeper than 1 m in forest soils. In a study of 22 timberland forest soils in western Oregon and Washington, 21% of total soil carbon can be found below 1 m, varying from 6% to 57% across sites. Globally, the amount of soil carbon in the second and third meters of soil has been estimated to be 56% of the total to 1 m. Including soil depths to 3 m (10 ft), forest soils may store over 1,000 trillion metric tons (1,200 trillion tons) of carbon in total, roughly 1.5x the amount of carbon currently in the atmosphere.

In addition to being a large pool of carbon, forest soils are generally considered to be very stable and resistant to large losses due to its chemical nature. In volcanic soils of the Pacific Northwest, in particular, this recalcitrance, or resistance to decomposition, is possibly due to bonding between organic matter and noncrystalline minerals that form in these types of soils. New inputs of carbon from dead leaves and roots to soil are processed by fungi and bacteria over time, but only a small amount of the new input ultimately makes its way into the stable pool, with the rest returning to the atmosphere as carbon dioxide. These additions to the stable pool are usually dwarfed by the large size of the pool itself and are difficult to measure directly.

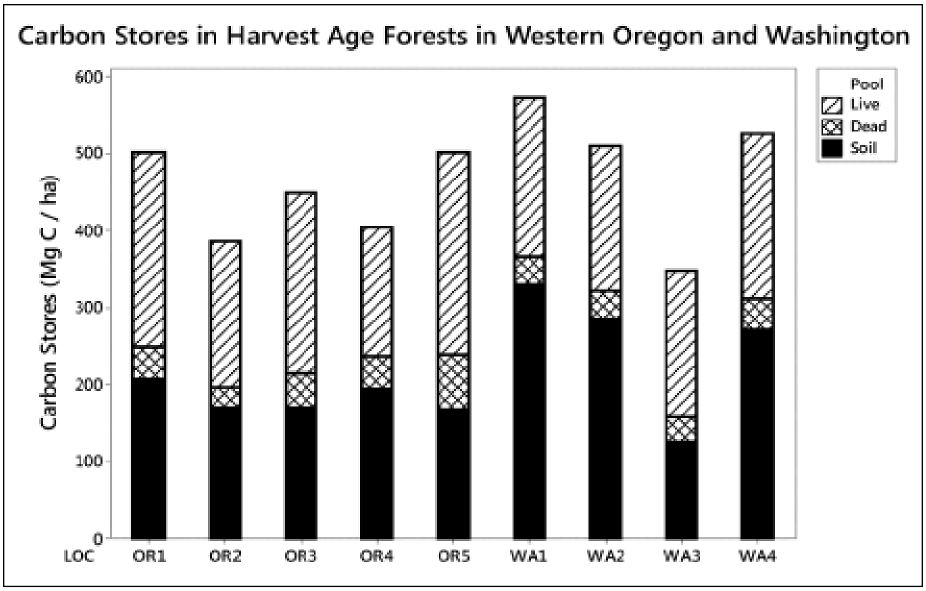
Given the large quantity of carbon stored in soil, there is some concern that disturbances to forest ecosystems could push some soils out of steady state, in the short term, and lead to a release of carbon from the soil, potentially contributing to the already large amount of greenhouse gas emissions from the burning of fossil fuels such as oil, coal, and natural gas for energy. This has implications for the carbon neutrality of timberlands. Thus, careful investigation of the carbon cycle in forest soils is a key component in deciphering the gains and losses of carbon from forests, and ultimately understanding the effects of forest soils on the global carbon cycle. Luke Nave, now at the University of Michigan, and colleagues have summarized existing literature in two meta-analysis review papers looking at two major potential causes of soil carbon change related to forestry: nitrogen addition/fertilization and harvesting.

Nitrogen (N) fertilization in the Pacific Northwest has been shown by numerous studies to increase tree growth. Faster growing trees store more carbon, so from the aboveground perspective fertilization appears favorable even after accounting for carbon and other greenhouse gas emissions/costs associated with the production and application of fertilizer. However, available nitrogen in the soil can affect organic matter decomposition rates, so there is some concern that adding N, while growing bigger trees, might lead to a net release of carbon from the forest if decomposition is increased as a result. The meta-analysis review of this topic, mostly at less than 1 m (3.3 ft) soil depth, indicates that fertilization appears to increase carbon storage in mineral soil by 12.2%, on average, across temperate forests.

Harvesting trees temporarily removes two sources of continual carbon inputs to forest soils, leaf litter and root turnover, which could be a source of concern in the short term. However, conventional harvesting creates a large pulse of organic matter/carbon that remains on the site from the branches, tops, needles, and stumps aboveground, and coarse and fine roots belowground. This pulse of residual harvest material could potentially replace the missing inputs until trees again dominate the site. Nevertheless, concern remains about the effect of harvesting on soil carbon. Some individual studies do show negative effects of harvesting on soil carbon, while some show increases in mineral soil carbon. The meta-analysis indicates that, on average across temperate forests, harvesting has no effect on mineral soil carbon stores down to 1 m (3.3 ft) or less.

Effects of management on deep soil (>1 m or 3.3 ft) are much less studied. To address this gap in knowledge, additional soil sampling to 3 m depth is underway at the Fall River Long-Term Site Productivity Study in western Washington. University of Washington researchers in collaboration with Weyerhaeuser Company plan to test the effects on soil carbon of removing the entire tree and all logging debris from the site and the effects of vegetation control post-harvest relative to bole-only harvest.

To further explore the effects of conventional timber harvesting on soil carbon, Weyerhaeuser Company initiated a study in 2010 to intensively measure soil carbon on 9 randomly-selected harvest-age stands on Weyerhaeuser ownership in Oregon and Washington. The study design accounts for the large variation seen in soil carbon within sites. Collaborators on the study include National Council for Air and Stream Improvement (NCASI), Oregon State University, Natural Resource Conservation Service (NRCS), US Forest Service, and others. Consistent with other studies the pre-harvest results indicate that productive timberland in western Oregon and Washington currently stores, on average, 100 to 350 metric tons of carbon per hectare (40 to 150 tons of C per acre) in mineral soil to 1 m (see Figure 1). The unique aspect of this study is the precision with which the average soil carbon storage is known, such that the statistical determination of small changes (on the order of 5-9% or better) in soil carbon can be made. Sites were harvested in 2012 using conventional methods and will be re-sampled in 2015 to begin to address the question of harvest effects on soil carbon in the region. ◆



SOURCE: WEYERHAEUSER COMPANY

Figure 1. Total carbon in harvest-age forests in western Oregon and Washington distributed among three broad ecosystem pools: "Live" includes living vegetation (trees and shrubs); "Dead" includes forest floor, downed wood, etc.; and "Soil" includes all mineral-soil-associated carbon to 1 m depth. The 9 sites were randomly selected harvest units on Weyerhaeuser company ownership in the region. This graph demonstrates the high relative importance of carbon storage in soil.

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For Further Study

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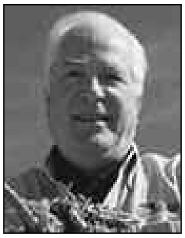
Forestry and Carbon Emissions Accounting

BY JAY O'LAUGHLIN



DENVER—"Hundreds of people across the country lined up Tuesday [July 29, 2014] to tell the Environmental Protection Agency (EPA) that its new rules for power-plant pollution either go too far or not far enough. The agency is holding hearings this week in Atlanta, Denver, Pittsburgh, and Washington on President Barack Obama's plan to cut carbon-dioxide emissions by 30 percent by 2030, with 2005 levels as the starting point. The rules are intended to curb global warming. Coal mines, electric utilities, labor unions, environmental groups, renewable energy companies, government agencies, religious and civil rights organizations, and others sent representatives to the hearings." (Associated Press, July 30, 2014).

What does the above story have to do with forest carbon management? Technically, it's about the "Tailoring Rule"—EPA using the Clean Air Act to control carbon-dioxide emissions from industrial facilities: trimming off, as a tailor would, small facilities to focus on big emitters. Practically, it's about how much we will be paying for energy. About 2% of the energy consumed in the US is from burning wood. Roughly 1/5 of wood bioenergy comes from burning firewood, the rest is wood converted to energy in industrial facilities like sawmills and paper mills, and increasingly, industrial-strength boilers like the one that heats the University of Idaho campus using sawmill residues, or that utility companies use to produce electricity. We could be producing more bioenergy from woody biomass, but if EPA regulates wood bioenergy emissions that is unlikely to happen.

How will the EPA treat "biogenic" emissions from wood burning? In 2011, the National Association of Forest Owners petitioned the EPA to exclude biogenic emissions from regulatory control. The EPA postponed the decision for three years to study the issue. The studies are in and time has expired. Still pending at this writing, however, is the EPA's decision on biogenic emissions.

There are hopeful signs regarding that decision. Bob Cleaves, president and CEO of the Biomass Power Association, observed that EPA's plan, currently being debated in the hearings mentioned above, talked about biomass in a positive light: "Burning biomass-derived fuels for energy recovery can yield climate benefits as compared to burning conventional fossil fuels." Furthermore, the bioenergy chapter in the National Climate Assessment released by the White House in May 2014 recognized biomass as "one component of an overall bioenergy strategy to reduce emissions of carbon from fossil fuel, while also improving water quality, and maintaining lands for timber production as an alternative to other socioeconomic options." The same report noted the role of biomass in keeping forests healthy enough to continue to serve as a carbon sink that can capture hundreds of millions of tons of carbon per year, and that bioenergy has the potential of displacing 30% of the nation's current petroleum consumption.

Cleaves said, "While we are not out of the proverbial woods yet, we have good reason to be encouraged by the recent signals from the White House and the EPA." The Tailoring Rule decision on biogenic emissions still looms large, and if the nation is to fully embrace bioenergy, the Clean Air Act must recognize biomass as a renewable source of energy with a favorable carbon profile when compared to fossil fuels. The issue is determining an appropriate framework for carbon emissions accounting. Cleaves said it will be extremely difficult to meet the ambitious new carbon reduction targets without biomass as an option for forested states looking to add a renewable and reliable baseload energy source. Without the bioenergy industry, Cleaves said it will be even harder to keep forested lands maintained and at a lower risk of wildfire. (see "EPA, White House signal support for biomass," *Biomass Magazine*, July 2014, p. 17).

The SAF is fully engaged in the biogenic emissions issue and perhaps you should be, too. If foresters don't speak out on such issues, policy makers will act based on what others say, and some groups are stridently against burning biomass to produce energy. (Remember the 2010 headline distilled from the Manomet report—"Wood worse polluter than coal?" Even though some people believe that, it's just not so.) Along with Elaine Oneil (author of this *Western Forester's* lead article) and seven other SAF members, I have been serving on the SAF's Carbon Accounting Response Team; four of the nine team members served on the EPA's Scientific Advisory Board on Biogenic Carbon Account-ing during the 2011-2012 study period. Another, Professor Bob Malmsheimer, was the principal author of the *Journal of Forestry* supplementary report on forest carbon management (Oct/Nov 2011, available at www.safnet.org/documents/JOFSupplement.pdf).

The team's report will be published

in the near future in the *Journal of Forestry*. The highlights have been presented to the EPA and others in various forums. The team concluded that energy resources derived from forests have the potential to play an important and ongoing role in mitigating greenhouse gas (GHG) emissions, and four key insights from peer-reviewed scientific literature can help inform policy makers and others concerned about the impacts of increased demand for bioenergy.

1) **Timing of benefits.** The long-term benefits of substituting biomass for fossil-fuel energy are not disputed, but the timing of those benefits is because it takes trees time to regrow the biomass used for energy production.

2) **Maintaining forest area and carbon stocks.** Threats to long-term maintenance of US forest carbon stocks come from pressures to convert forestland to non-forest use, not from increased demand for wood. Although increased demand stimulates an investment response that increases forest carbon stocks by expanding forest area and enhancing productivity, this response is usually overlooked in forest carbon accounting studies.

3) **Focus on cumulative emissions rather than short-term "carbon debt."** The time it takes to regrow wood after burning it for energy is called carbon debt. The most effective GHG mitigation measures are those that provide the lowest long-term net cumulative emissions of carbon without significant increases in net emissions (i.e., carbon debt) in the short to intermediate term. The Intergovernmental Panel on Climate Change recognizes that this can include annual yields of timber, fiber, and energy feedstocks.

4) **Correctly characterizing forest biomass impacts.** Several issues surface here. First, biogenic emissions characterization should be consistent with fossil fuels, which employ a 100-year period, not 20 or 40 years as in some studies. Second, studies sometimes feature types of forest biomass unlikely to be used for biomass, such as large trees. In areas with active log markets only crooked or diseased large trees will be used for energy production. Third, most studies tend to ignore the effects of forestry investments, which are essential to retaining forestland and supporting sustainable forest management practices. Policymakers need to consider that laws and regulations attaching an emissions liability to biogenic emissions will likely dampen the investment response.

Washington-watchers say the EPA is sitting on a draft of its proposed carbon accounting framework. Those who will be affected by it would like an opportunity to review the draft now, rather than later when the administration finds it convenient. Let your Congress members know that you care about this issue and would like to have the EPA's draft biogenic carbon accounting framework released soon. ◆

Jay O'Laughlin is IESAF Forest Policy Committee chair and professor of Forestry and Policy Sciences at the University of Idaho in Moscow. He can be reached at 208-885-5776 or jayo@uidaho.edu. The author thanks SAF Carbon Response Accounting Team members Jim Bowyer, Bob Malmsheimer, and Reid Miner for review comments.

Evaluating Forest Carbon Projects

BY DAVID A. FORD

Concern about climate change by governments, businesses, and citizens is driving carbon markets in the US and across the globe. Carbon markets and offsets are a component of national and international attempts to mitigate the growth of concentrations of greenhouse gases (GHG), including carbon dioxide. Forests are seen by many as a way to protect existing large stores of carbon and to sequester and store even greater amounts of atmospheric carbon in the coming decades.

Here in the US, there are growing opportunities for forest landowners to generate revenue in the regulated and voluntary carbon markets. Professional foresters need a range of information to help determine whether a forest carbon offset project is practical and financially viable on the land they manage or own.

Let's start with some basics. First, a carbon offset project is a third-party verified activity that either avoids an emission of greenhouse gases or sequesters carbon. A project must follow a set of rules contained in a protocol approved by the carbon program selected for use by the project proponent. A carbon offset is a reduction in emissions of carbon dioxide or greenhouse gas equivalent in order to compensate for an emission made elsewhere. One offset is equal to one metric ton of carbon dioxide (CO_2).

Today, there are four widely recognized carbon programs operating in the US:

American Carbon Registry (ACR)—A program of Winrock International, it is a nonprofit US carbon market standard and registry. ACR was the first private voluntary greenhouse gas registry in the US and continues to lead voluntary carbon market innovation. ACR also serves as a registry for the California Air Resources Board's Cap and Trade program.

California Air Resources Board (ARB)—A program of California EPA, ARB manages the state's Cap and Trade Program established under California law. The Global Warming Solutions Act of 2006 (AB-32) is designed to return California emissions to 1990 levels by 2020. The Cap and Trade program, which includes forestry offsets, is designed to contribute to the statewide emissions target.

Climate Action Reserve (CAR)—A national voluntary offset program focused on ensuring environmental integrity of GHG emissions reduction projects to create and support financial and environmental value in the US carbon market. CAR also serves as a registry for the ARB's Cap and Trade program.

Verified Carbon Standard (VCS)—Founded in 2005, VCS is best known for projects under the Clean Development Mechanism (CDM), with a focus on Reduced Emissions from Deforestation and Degradation (REDD) projects in developing countries.

All carbon offset projects must demonstrate they are additional, real, measureable, verifiable, and permanent. Each carbon program and its approved protocols vary in the methods used to demonstrate these project attributes.

Additional—Climate benefits are above and beyond "business as usual" or a "baseline" of reductions that would have happened anyway.

Real and Measurable—A project must be able to measure and conservatively calculate the benefit it is providing.

Verifiable—An independent third-party can confirm the project meets the protocol requirements and procedures, including the accuracy of the carbon offsets claimed.

Permanent—The project reductions must be equivalent to the emissions the project is offsetting. Forest carbon projects measure the number of years the carbon is stored.

There are two categories of carbon offset projects. The most common projects are those that avoid an emission of greenhouse gas. These project types include capturing and destroying greenhouse gases through activities such as managing ozone depleting substances, coal mine methane, livestock manure digesters, and organic waste composting. The second category is those that sequester carbon from the atmosphere, namely forestry projects.

Three types of forest projects qualify for offsets under the major carbon programs: reforestation, avoided conversion, and improved forest management.

Reforestation. These projects

require tree planting or removal of impediments to natural reforestation on land that previously had no forest or had been subject to a significant disturbance that resulted in a considerable loss of aboveground carbon. For example, in California, several landowners are working to register carbon projects where they voluntarily replanted trees in areas previously impacted by wildfire.

Avoided Conversion. These projects require a perpetual conservation easement that prevents the conversion of forestland to non-forest uses. The landowner must be able to demonstrate that there is a significant threat of conversion of the project lands to a non-forest land use.

Improved Forest Management (IFM). These are the most common forest projects and require management practices that will result in storage of more carbon than is required by law and regulation, and at higher levels than would be generated through common forestry practices in the local geographic area. For example, extending rotation age and harvesting less than annual growth are practices that could qualify under this project type. Projects located on lands that are economically marginal to manage can be a good fit, as by adding some carbon revenue, the overall economic return of management can be improved.

A range of protocols are approved by each major carbon program. Each one is like a recipe book that details eligibility requirements, forest management commitments, carbon accounting rules, monitoring and verification frequency, reversal penalties, and potential enforcement actions and liabilities. For example, forest protocols range in project time commitments from 20 years up to 200 years. Some protocols include prescriptive forest management requirements, while others offer flexibility in forest management activities.

Before entering into a carbon project, the landowner should review and evaluate the carbon program rules and the specific protocol forest management requirements, legal obligations, and financial commitments. NIPF landowners should be encouraged to obtain advice from their professional forester and an experienced forest carbon consultant, as well as their attorney and accountant.

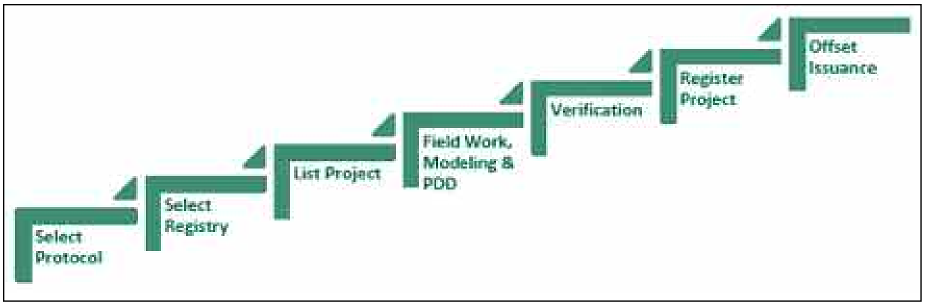


Figure 1. Project Development Steps

SOURCE: L&C CARBON LLC

Developing a forest carbon offset project

Developing a forest carbon offset project can take anywhere from 12 to 18 months, requires specialized knowledge and skills, and will require a range of legal and forest management commitments by the landowner.

The first steps to develop a forest carbon project are (see Figure 1):

- Select a carbon program (ACR, ARB, CAR, or VCS);
- Select a project type (reforestation, avoided conversion, or IFM); and
- Select a methodology/protocol approved by the selected carbon program. It is important that the carbon program and protocol requirements and commitments are a good fit for the values and objectives of land ownership.

Next, the landowner and/or his representative:

- List the project with the carbon program registry by completing the registry listing form. Depending on the registry, the listing process can be relatively simple to very complex, such as in the case of an ARB project.

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Carbon Conversions

Converting Biomass to Carbon

Carbon is ~50% of bone-dry biomass
Example: 3.0 tons of biomass = 1.5 tons of carbon

Converting Carbon to CO_2

Multiply tons of carbon by 3.6667
Example: 1.5 t C = 5.5 t CO_2

CO_2 Equivalents

Unit	Approximate equivalent in tons of CO_2
1 thousand board feet (mbf)	5.0
1 load of logs (25 tons)	22
1 standard telephone pole	0.5

CO_2 per tree varies by species and diameter

	Tons of CO_2 by DBH				
Species	**2”**	**4”**	**6”**	**12”**	**21”**
Douglas-fir	0.01	0.06	0.15	0.83	3.27
Alder	0.01	0.05	0.13	0.70	2.66
True fir/hemlock	0.01	0.05	0.12	0.70	2.79
Pine	0.01	0.04	0.11	0.60	2.33
Hardwoods (oaks, maple)	0.01	0.05	0.13	0.74	2.99

SOURCE: USDA FOREST SERVICE GEN. TECH. REP. NE-319

• Once the listing is approved by the registry, begin project development activities.

The most significant project development steps are:

• Completing an inventory of the project area—the forest protocol specifies the inventory statistical tolerances that must be met. A carbon inventory can include non-merchantable tree stems, in some cases down to 1 inch dbh. Existing inventories can be used; however, a third-party verifier must be able to obtain a specified level of agreement with measurements and estimates.

• Modeling—several modeling steps are necessary to quantify the carbon profile of a project (the carbon offsets that can be registered and sold). These include a common practice baseline, a project baseline, and the planned project activities. Modeling requires knowledge and experience with protocol-approved growth and yield models, a harvest scheduler, and all applicable legal constraints on forest management, such as forest practices laws.

• Project Documentation—a project design document (PDD) must be completed. This document includes all the details about the project design and implementation. The PDD is used by the independent third-party verifier as an information source.

• Third-Party Verification—an approved verifier assesses whether the project conforms to the criteria and requirements contained within the protocol and the registry program guidance.

Once the landowner obtains a positive verification report and approval by the registry, the project is registered, carbon offsets are placed in the landowner's account, and the offsets can be sold.

So can a forestland owner make money on a carbon project?

The answer can be yes; however, a carbon project must be consistent with the landowner's values and forest management objectives.

Carbon offset returns will likely never be competitive with the value of PNW stumpage, especially sawtimber. However, annual carbon revenue can supplement periodic timber harvest revenue.

The most financially attractive IFM carbon projects can be those where carbon stocks are well above the common practice baseline. These projects can generate significant revenue in the first year of a project, referred to by carbon developers as a year one bump. For example, a 15,000 acre project that can generate 50 offsets per acre in the first year can produce 750,000 offsets with a gross value of $6 million, based on an offset price of $8.00, or $400 per acre. After year one, carbon offset generation is based on annual growth minus harvest. However, it is important to model all income and expenses over the entire project period to ensure a net project return.

Currently, the best carbon offset prices are found in the California regulated market (ARB) and are in the $8.00 to $11.00 range per ARB offset credit. ARB reported just over 11 million tons of offset credits issued as of July 2014, of which 52 percent were generated from forestry projects. Demand projections for ARB offsets vary; however, current demand is estimated to be about 200 million offsets between now and 2020. Many expect ARB compliant offset shortages in the later years of this decade. Time will tell if those predictions will materialize. Offsets from any forestry project in the continental US can be sold into the California regulated market.

The US voluntary offset market remains an option for forest landowners as more businesses announce plans to reduce or neutralize their carbon footprints. Microsoft, GM, United, National Geographic, and The Walt Disney Company are just a few examples of companies purchasing voluntary carbon offsets in the US and around the world.

Carbon offset prices in the voluntary market range from a few dollars to well above the ARB market price. Buyers of voluntary offsets are often looking for projects that offer secondary benefits to the environment (wildlife habitat) and local communities, and some are willing to pay for those additional benefits. Together, ACR, CAR, and VCS have registered nearly 250 million carbon offsets from voluntary carbon projects worldwide, with forestry making up nearly 25% of the supply.

Before entering any carbon market, it is important to model all revenue and costs across the entire project life, whether it is 20 years or 200 years, to ensure the project is profitable, as well as compatible with the landowner's values and forest management objectives. ◆

David A. Ford is a professional forester and president of L&C Carbon LLC, a carbon consulting and development firm based in Dundee, Ore. He can be reached at 503-449-6957 or davidford27@gmail.com.

Sources

American Carbon Registry (ACR) Program: http://americancarbonregistry.org/

California Air Resources Board (ARB) and the California Cap and Trade Program: www.arb.ca.gov/cc/capandtrade/capandtrade.htm

Climate Action Reserve (CAR) Program: www.climateactionreserve.org/

Verified Carbon Standard (VCS) Program: www.v-c-s.org/

Ecosystem Marketplace—a Forest Trends Initiative: www.ecosystemmarketplace.com/

A Carbon Q and A with Jessica Orrego

Forest managers are Jacks and Jills of all trades, but how much do you know about carbon? Now's the time to test your knowledge. A few SAF members posed questions they had about carbon to the *Western Forester* and we asked Jessica Orrego of the American Carbon Registry to respond to the questions.

Question: On a relative scale, how do the various carbon "sinks" compare?

Answer: Oceans are by far the largest carbon sink on earth, followed by soil, the atmosphere, and forests:

Oceans: 38,000 Petrograms (Pg) or 93%
Soil: 1,500 Pg or 3.7%
Atmosphere: 750 Pg or 1.9%
Forests (plants): 560 Pg or 1.4%
Source: NASA, see graphic below

Question: As a forester, what should I know about carbon and why should I care about it?

Answer: Forest managers should know that there are opportunities for them in the carbon market if they choose to commit to increasing or maintaining carbon stocks on their land. A forest owner might be able to significantly increase revenue generated from their land by implementing a carbon sequestration project. Increasing numbers of industrial landowners are implementing carbon projects on their land holdings. These projects have long commitments, so there is a need for foresters to be knowledgeable about the management implications of carbon projects and how to work within the confines of the carbon project while still maintaining a stream of wood products to market. Carbon projects are a tested means of providing monetary value for trees left on site.

Question: As a forester for a private landowner, are there any forest management strategies we should follow and promote relative to carbon issues? Do "longer" rotations make a significant difference?

Answer: Forest management strategies that enhance stocking can include increasing rotation length, but can also include increasing retention, removing competing vegetation, thinning to promote long-term growth, and stocking or changes in regeneration prescriptions. In some cases, forest owners may already be implementing strategies that would be considered eligible because they are above and beyond common practice. Any forest owner interested in sequestering carbon and marketing credits for sale should contact a carbon registry for more information.

Question: Are there strategies foresters should pursue that might provide positive revenues and returns on investments?

Answer: A forest manager should contact a registry first in order to learn more about the various voluntary and compliance offset protocols that are available for them to pursue. Carbon credits are not marketable until the project has been registered and then verified by an independent third party. Offsets are then issued to the project by a registry and/or compliance program.

Question: Is carbon sequestration in forests a useful, feasible strategy to pursue, and can such a strategy potentially make a difference?

Answer: Carbon sequestration enhances forest growth and productivity, and when implemented within a carbon offset program, creates a tradable environmental commodity. Carbon sequestration is feasible: There are many carbon sequestration proj-

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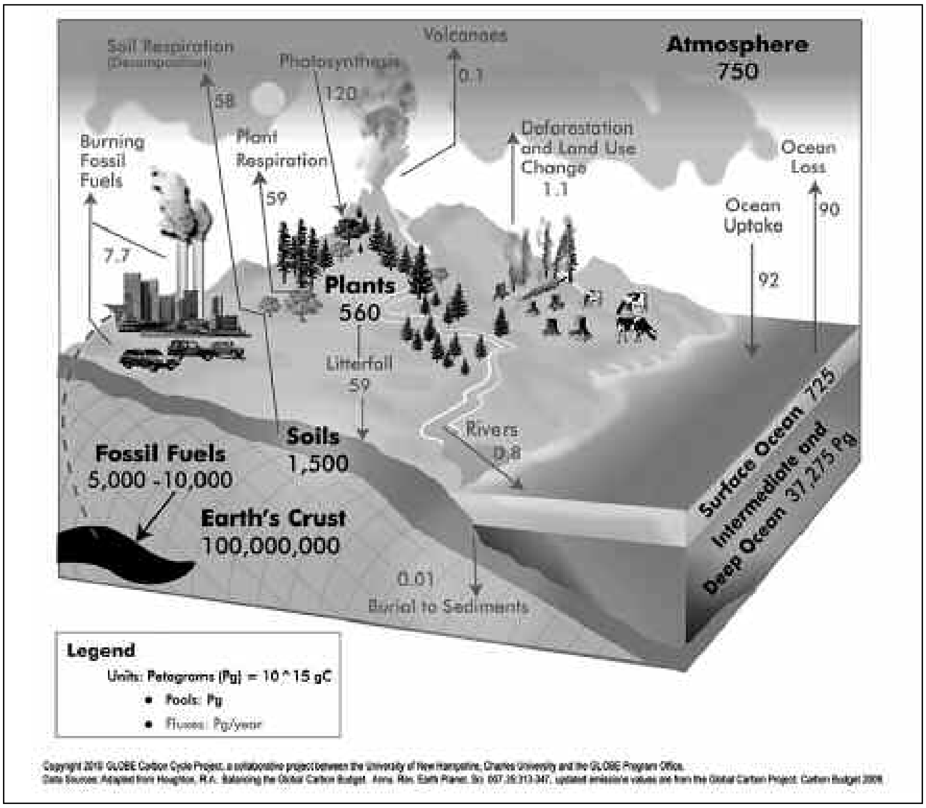


The Global Carbon Cycle

ects that have been registered in both voluntary and compliance markets and have generated offsets that have been sold. Carbon offset projects can make a difference ecologically by increasing carbon stocks across large forested areas, and financially, by introducing a cost-containing mechanism into cap-and-trade programs. Carbon projects also provide tangible incentives for some communities and individuals to retain forest cover where it may have been removed for land conversion or other monetary reasons. These projects can certainly make a difference when implemented at a landscape level.

Question: How big an industry is the carbon market today? How is it measured? However it is measured, is the market growing annually? Why or why not?

Answer: In the California offset program there is an estimated demand of 26 million tons of offsets before the end of 2015 and approximately 200 million tons by the end of 2020. To date, only 11.2 million tons of offsets have been issued, of which 5.8 million were from forestry projects. In the voluntary market, 76 million tons of offsets were transacted in 2013. This decreased from previous years; however, the decline is mostly attributed to voluntary projects transitioning into the California market. In general, the voluntary market has grown steadily over the past 5 years and projects continue to be registered.

Question: Is there an international carbon market?

Answer: There are many voluntary offset projects located outside of the US, and many buyers of these offsets are also based in Europe and Asia. There are also emerging compliance carbon markets in China and Australia. The California carbon market is currently developing a linkage with Quebec, and it is possible that linkages with Mexico and other countries will be considered in the future.

Question: Who wants to buy our carbon in the current market, why, for how long, and how much are they willing to pay?

Answer: The California Cap and Trade program provides a mechanism for forest owners in the lower 48 states to monetize the carbon stored in their forests when they commit to long-term maintenance of high stocks or changes in management that result in increased carbon storage. Forest owners can sell each ton of verified CO_2 equivalent compliance offset credits for \$8-\$10. There is currently a market until 2020, and it is likely to be extended to 2030.

Landowners have the option to develop forest carbon offsets under voluntary programs and sell credits to corporate buyers that are not subject to the Cap and Trade program.

Question: How do annual revenue returns or returns on investments compare between carbon selling and traditional forestry that involves regular timber harvest and the sale of logs?

Answer: Implementing a carbon offset project on forestland does not prohibit a landowner from harvesting timber or selling logs. Carbon sales will not always bring in enough revenue to forgo all harvesting; however, many conservation organizations have used carbon offset sales to provide revenue from land that is not harvested to cover costs associated with forest conservation. Every forest property is going to have a different bottom line when it comes to the split between realizing carbon revenues or timber revenues. There is the possibility of selling logs when the timber market is good and selling carbon credits when the timber market is low. This should be evaluated on a case-by-case basis and is going to be related to the size of the project area, the type of timber, access to markets, common practices in the region, and willingness of the owners make the commitment.

Question: What time commitments must a landowner make to sell carbon? Do the commitments/constraints run with the land like an easement or a mineral right?

Answer: Forestry offset projects under the California Air Resources Board program must commit to 100 years of monitoring after the final offsets are issued. The American Carbon Registry's voluntary program requires a minimum 40-year commitment from project inception and some programs carry a longer year commitment. While a project can be terminated at any time, there are consequences of early termination. Commitments do run with the land, and like any encumbrance, a carbon project can limit the use of the property by a new owner.

Question: What is the definition of additionality? How is the baseline defined and measured?

Answer: Additionality is defined as carbon emission reductions or removals that would not have occurred in the absence of the project and are not required by any law or regulation. A project baseline is the counterfactual scenario that would have occurred in the project area over the project lifetime had the carbon project not been implemented. A baseline is defined in a number of ways, depending on the carbon offset program and quantification protocol used, and importantly, the type of project. For Improved Forest Management Projects the baseline is typically defined by determining what could have legally and financially been harvested within the project area. For reforestation projects, the baseline is generally defined as what could have grown naturally within the project area if planting had not occurred. For avoided conversion/REDD projects, the baseline is typically defined as a rate of conversion or deforestation.

Question: What traditional forest management activities are constrained by a contract to sell carbon?

Answer: Many forest carbon protocols allow what would be considered traditional forest management activities. Specifically, many Improved Forest Management project types are written with that expectation. Most forest carbon protocols require a high percentage of native species, a mixed-species composition, specified age class distributions, and demonstration of sustainable forest practices through various avenues. Further, carbon stocks must either be maintained or increased over the project lifetime. The California forest protocol does limit the size of even-aged management regeneration cut blocks. Each protocol is different in this regard, but they all allow for most traditional forest management activities. This will be dependent on the type of ownership and the existing management goals of the forest owners.

Question: Who provides market oversight?

Answer: Offsets are most often transacted bilaterally between an offset project owner and a buyer, or with brokers acting as intermediaries. In all cases, offsets are issued by a registry or body that has ensured that the offsets have been verified and generated according to the requirements of the protocol and program and that offsets are held in account by the legal owner.

For the California carbon market, all market oversight is enforced by the state itself, though this does not include audits of contract compliance. In the voluntary market, registries that run programs provide the same type of market oversight.

Question: Is the market centralized?

Answer: Compliance markets tend to be more centralized since the buyers are known. In contrast, the voluntary market is less centralized and operated predominantly through bilateral deals between landowners and buyers such as offset retailers and corporations.

Question: Are there consultants that focus on the carbon market?

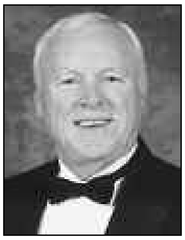
Answer: There are many consultants that focus on the carbon market, and specifically forest carbon. These consultants can help landowners develop and conduct inventories, develop baseline models, and assist with the carbon quantification. There are also companies that provide both technical services and investment capital. These companies can represent landowners or simply work with them as a partner or consultant. ◆

About Jessica Orrego

Jessica Orrego is director of forestry for American Carbon Registry (ACR) in Arlington, Virginia. She is responsible for overseeing the listing, verification, and registration of forest carbon projects developed under the California compliance and early-action offset protocols as well as under ACR's voluntary carbon offset methodologies. Jessica has a Bachelor of Science in biology and a Master of Science in forestry from the University of Vermont. She can be reached at 917-838-9886 or jorrego@winrock.org.

We Remember

Morris (Morrie) E. Boles
1924-2014



Morris (Morrie) E. Boles passed away with his loving family by his side on July 15. Morrie was born in Beech Grove, Indiana, on February 1, 1928. In Beech Grove Troop #79, Morrie earned the Eagle Scout award and enjoyed many years of fellowship with the Boy Scouts of America. He made lifelong friendships and principles he learned as a young man shaped his lifetime attitude of respect toward others.

After graduation from high school, Morrie enlisted in the U.S. Navy. He was stationed at Jacksonville, San Diego, and Bremerton Naval Station, and later served aboard the USS San Marcos (LSD-25). In 1954 Morrie received a Bachelor of Science degree in forestry from Purdue University. Morrie and his wife Jan enjoyed his career in forestry with the state of Washington in Beaver, a small community on the Olympic Peninsula. After serving in various positions with the Department of Natural Resources, he retired in July 1982. He became licensed as a Real Estate Associate Broker with Coldwell Banker Evergreen Olympic, Inc. in Lacey, Wash., and spent more than 20 years in the real estate profession.

Morrie was active in the Society of American Foresters, achieving the honor of Fellow in 1991, Certified Forester since 2002, and Golden Member in 2004. He was also active in several Real Estate organizations earning multiple awards and holding leadership positions. He was a life member of the Elks.

Morrie had many friends and truly enjoyed hearing their life stories. Morrie had a true love of people and never had a harsh word to say about anyone. He enjoyed his "Wednesday Wonders" golf group; SAF national, state, and chapter meetings and conventions; ballroom dance group; Greater Olympia Dixieland Jazz Society; Navy reunions; planting trees and watering his grass in the summer; and traveling.

He was preceded in death by his beloved wife of 49 years, Jan. His memory will be cherished by his wife, Carol; son, Mark (Susan); daughter, Brenda; three grandchildren; nieces and nephews; and many dear friends.

Contributions can be made to the Log-A-Load for Kids program. Make check payable to: Children's Hospital and mail to Washington Contract Loggers Association, Log-A-Load for Kids Program, PO Box 2168, Olympia, WA 98507; please include "Memorial for Morris Boles." ◆

2015 PNW Forestry Leadership Academy Slated for January 16-17

All SAF members are invited to participate in the 2015 PNW Forestry Leadership Academy on January 16-17 at the Oregon Garden Resort in Silverton, Ore.

The goal of the forestry leadership academy is to equip foresters and forest landowners to take active roles in leading Pacific Northwest forestry organizations. The academy will help new and existing leaders gain the skills they need to succeed, and will be of interest to the general membership as well.

For the academy, the Oregon and Washington State Society of American Foresters are joining forces with the Oregon Tree Farm System, Oregon Small Woodlands Association, Oregon Forest Resources Institute, OSU Forestry and Natural Resources Extension, Cispus Institute, Washington Farm Forestry Association, and Washington Tree Farm Committee for this two-day event organized by the Partnership for Forestry Education. Academy content will focus on delivering leadership skills that cross organizations.

The academy starts with lunch on Friday, January 16, followed by a keynote presentation and panel of landowners and foresters on the topic of Land Ethic Leadership.

Attendees will have the opportunity to attend concurrent sessions led by Cispus Institute faculty on both Friday afternoon and Saturday morning. Featured topics include engaging volunteers, leadership in the volunteer arena, conducting effective meetings, understanding learning styles, engaging audiences through environmental education, understanding conflict, and facilitation techniques. In addition, other sessions will be conducted by SAF members and others on fundraising, membership, forest policy, forest history, and more. An additional session on managing media interviews to deliver our messages will educate attendees on how today's media works, tips and suggestions on delivering the "right" message, and experience in developing and using message boxes to focus your points.

Saturday, January 17 starts off with a group breakfast and a general session talk. Attendees then break into concurrent sessions before gathering for a group lunch and wrap-up presentation.

The leadership academy is generously supported by grants from the American Forest Foundation, USDA Forest Service-State and Private, Oregon Forest Resources Institute, and the SAF Foresters' Fund. These grants will allow for a $25 registration fee and one night's lodging at the Oregon Garden for SAF student members. The registration fee for SAF members will be approximately $100. Watch for additional details in the November/December issue of the *Western Forester*.

For more information on the 2015 PNW Forestry Leadership Academy, contact Mike Cloughesy, Oregon Forest Resources Institute, at 971-673-2955, cloughesy@ofri.org, or www.forestry.org/oregon/2015Leadership.

Calendar of Events

NCASI West Coast Regional Meeting, Sept. 22-24, Heathman Lodge, Vancouver, WA. Contact: Karen Phelps, 541-752-8801, kphelps@ncasi.org, www.regonline.com/builder/site/Default.aspx?EventID=1569923.

CESCL: Certified Erosion and Sediment Control Lead Training, Sept. 23-24, Oct. 14-15, or Nov.18-19, Bellevue, WA. Contact: NWETC.

Access, Easements, Rights-of-Way, and Timber Trespass: What Every Forest Manager Needs to Know, Sept. 25, Grand Mound, WA. Contact: WFCA.

105th Pacific Logging Congress—7th In the Woods Show, Sept. 25-27, Molalla, OR. Contact: 425-413-2808, rikki@pacificloggingcongress.com, http://pacificloggingcongress.org/content/convention.

Society for Ecological Restoration Northwest and Great Basin Joint Regional Conference—Collaborative Restoration, Oct. 6-10, Eagle Crest Resort, Redmond, OR. Contact: Rolf Gersonde, rolf.gersonde@seattle.gov, www.ser.org/events/calendar.

Model Toxics Control Act: An Introduction, Oct. 8, Kirkland, WA. Contact: NWETC.

SAF National Convention, Oct. 8-11, Salt Lake City, UT. Contact: Christopher Whited, 301-897-8720, whitedc@safnet.org, www.xcdsystem.com/saf/site14/.

Pacific Northwest Reforestation Council, Oct. 16, Heathman Lodge, Vancouver, WA. Contact: WFCA.

Oregon Wood Solutions Fair, Oct. 23, Oregon Convention Center, Portland, OR. Contact: Jaime Krohn, 312-841-8272, jaime@woodworks.org, www.woodworks.org/education-event/2014-oregon-wood-solutions-fair/.

Inland Empire SAF annual meeting, Oct. 26-28, Palouse Divide Lodge, Emida, ID. Contact: Tera King, 208-883-4488 x133, king@nmi2.com.

23rd Annual Oregon Water Law Conference, Nov. 6-7, Portland, OR. Contact: Elizabeth Skirving, 800-574-4852, elizabeth@theseminargroup.net, www.theseminargroup.net/seminar.lasso?seminar=14.WATOR.

Working Forests Workshop, hosted by WSSAF, Nov. 12, Saint Martin's University, Olympia, WA. Contact: Ellie Lathrop, ellie.lathrop@weyerhaeuser.com, www.forestry.org/washington/working-forests.

Wildlife in Managed Forests: Songbirds and Early Seral Habitats, Nov. 18, Linn County Expo Center, Albany, OR. Contact: Fran Cafferata Coe, 503-680-7939, fran@cafferataconsulting.com, http://oregonforests.org/songbird-symposium.

Field Technology Conference, Nov. 19-20, Holiday Inn Portland Airport, Portland, OR. Contact: WFCA.

WSU Building Soils for Better Crops Conference, Dec. 10, Big Bend Community College, Moses Lake, WA. Contact: Andrew McGuire, 509-754-2011, andrew.mcguire@wsu.edu, http://cahnrs.wsu.edu/event/wsubsfbc/.

Forestry Leadership Academy, Jan. 16-17, 2015, Oregon Garden Resort, Silverton, OR. Contact: Amanda Mattern, 503-224-8046, amanda@forestry.org, www.forestry.org/oregon/2015Leadership.

Washington State SAF Legislative Reception, Jan. 22, Olympia, WA. Contact: Ellie Lathrop, 360-274-3057, ellie.lathrop@weyerhaeuser.com.

Joint Inland Empire and Montana SAF Leadership Conference, Feb. 13-14, Lutherhaven, Coeur d'Alene, Idaho. Contact Phil Aune, psaune@gmail.com.

2015 Washington State SAF annual meeting, joint with Washington Chapter of The Wildlife Society, Apr. 15-17, Great Wolf Lodge, Grand Mound, WA. Contact: Peter Heide, 360-791-8299, peter@tkgforestry.com.

2015 Oregon SAF and Oregon Chapter of The Wildlife Society joint annual meeting, Apr. 29-May 1, Eugene Hilton, Eugene, OR. Contact: Dale Claassen, 541-954-6953, dale@sperry-ridge.com, or Fran Cafferata Coe, 503-680-7939, fran@cafferataconsulting.com.

Contact Information

WFCA: Western Forestry and Conservation Association, 4033 SW Canyon Rd., Portland, OR 97221, 503-226-4562, richard@westernforestry.org, www.westernforestry.org.

NWETC: Northwest Environmental Training Center, 425-270-3274, https://nwetc.org/.

Send calendar items to the editor at rasor@safnwo.org.

SAF Council Updates—Elections: Your vote is critical to SAF's future

BY JOHN WALKOWIAK, ED SHEPARD, AND JOHNNY HODGES

This coming October all SAF members will receive a ballot for election of the next vice president. In addition, there are a series of national referendums this year that will bring SAF into compliance with the passage of a new law in the District of Columbia where SAF is incorporated.

SAF members voted in 2013 to accept governance under the new law; compliance with the new law requires changes to our governance documents. Currently, those documents are as follows:

1) Articles of Incorporation dated October 3, 1928, stating the "business and objects" of the Society and the number of its "managers."

2) Constitution adopted by a referendum of the members in 1969 and most recently revised in 2008. This has been the fundamental governance document of SAF and a vote of two-thirds of voting SAF members is required to amend it.

3) SAF's current Bylaws prescribe operational procedures and guidelines for Council, committees, state societies, divisions, and chapters and may be amended by action of Council.

This year's referendums will involve a series of votes. Council urges you to vote to modernize our governing documents, Articles of Incorporation, and Bylaws. We are also asking for your approval of slight changes in the way our mission statement reads.

Below are the items up for vote along with a brief explanation. The bold-faced text shows the exact wording of the question up for vote and the regular text provides a short commentary on the topic.

Articles and Bylaws

Item #1.1: To use the revised Articles of Incorporation to reincorporate under the new District of Columbia Nonprofit Corporation Act of 2010 as directed by the membership in 2013.

In 2013 the membership voted to accept to be governed by the District of Columbia Nonprofit Corporation Act of 2010. As part of that process, SAF is updating our Articles of Incorporation, which were originally written in 1928.

Item #1.2: To accept the revised "Bylaws" as the fundamental governance document of SAF, replacing the existing Constitution.

Under this recommendation, the Constitution will be renamed "Bylaws" in order to bring SAF in line with conventional definitions and expectations of nonprofit governance. As is true for the existing Constitution, the new Bylaws will require a two-thirds vote of the membership for amendment. Items in the current SAF Bylaws that can be changed by Council vote will move to a Policy and Procedures manual that will be updated as needed by Council.

Mission Statement

Item #2.0: To approve the revision of SAF's mission statement as follows (**Bold** = added; ~~Strikethrough~~ = removed):

> The mission of the Society of American Foresters is to advance ~~the~~ **sustainable management of forest resources through** science, education, **and** technology~~, and practice of forestry~~; to enhance the competency of its members; to establish professional excellence; and to use ~~the~~ **our** knowledge, skills, and conservation ethic ~~of the profession~~ to ensure the continued health**, integrity,** and use of forest**s** ~~ecosystems and the present and future availability of forest resources~~ to benefit society **in perpetuity**.

The concept here is to create an open mission statement that will apply not only to foresters but also to a broader membership to attract natural resources managers who also work to manage our forest resources.

Membership

Originally, Council voted and proposed in the 20-page insert in the August 2014 *Forestry Source* that members would vote to simplify current membership language involving Professional members, Conditional members, Associate members, Technician members and International members. Subsequent to the publication of this 20-page insert and extensive member discussions across the country, it became clear that there was a lack of clarity on the benefits, rights, and possible impacts on combining all existing membership categories into a singular "Member" category. So Council voted on August 18 to remove referendums #3.1-3.6 addressing Membership categories. Council wants to extend the dialogue involving membership categories over the next 12 months for increased clarity and transparency.

Left to right: 2014 Council representatives Johnny Hodges, Ed Shepard, and John Walkowiak.

The votes on the new Articles of Incorporation, Bylaws, and changes to the Mission Statement are vital for SAF's future—we urge a "yes" vote on all ballot measures. We also urge your involvement in future conversations involving SAF membership categories as we strive to keep SAF relevant and growing. ◆

This Council report is a joint effort between District 1 Council Representative John Walkowiak (253 320-5064, jewalkowiak@harbornet.com); District 2 Council Representative Ed Shepard (503-487-6423, sssstr1@comcast.net); and District 4 Council Representative Johnny Hodges (970-226-6890, jah.16@live.com).

New Regional Forester Named

Jim Pena began his Forest Service career in Oregon more than 35 years ago; he returns as regional forester to lead the agency in Oregon and Washington.

Pena, who started August 4 in the Portland, Ore., Region 6 headquarters, previously served as associate deputy chief for the National Forest System in the agency's Washington, D.C., national headquarters.

Pena has led the National Forest System programs of Forest Management, Range Management, Engineering, Recreation/Heritage/Volunteer Programs, Natural Resource Management, and Watershed/Fish/Wildlife/Air/Rare Plants.

Prior to coming to this position, he was the deputy regional forester for State and Private Forestry in the Pacific Southwest (California) Region. Pena also brings experience from multiple agency-wide special assignments

He graduated from Humboldt State University with a bachelor's of Science degree in forest resource management in 1980. He is a member of the Society of American Foresters.

Pena succeeds Kent Connaughton, who retired after a 36-1/2 year career with the Forest Service. ◆

WSU to Re-establish Forestry Major

In December 2011 Washington State University (WSU) completed phasing out its long-standing major in "Forestry" (see March/April/May 2012 *Western Forester*). This change coincided with the merger of the former Department of Natural Resource Sciences and the former School of Earth and Environmental Sciences to form the School of the Environment (SOE) in January 2012. Over the past two-and-a-half years, SOE has replaced the existing undergraduate degrees/majors with majors in "Wildlife Ecology and Conservation Sciences," "Environmental and Ecosystem Sciences," and "Earth Sciences." The unit has also hired several new faculty members over the past year in key areas. These and other changes have substantially strengthened our program offerings and hold considerable promise.

As a part of the Washington State budget passed in the final days of June of 2013, WSU was mandated to re-establish its Forestry major. After a year of work devoted to evaluating alternative approaches to re-establishing the Forestry major on the Pullman campus, the college administration elected to establish a newly updated Forestry major. WSU will seek accreditation of the forestry major by the Society of American Foresters as soon as possible. Keith Blatner has been appointed program leader for Forestry to guide this effort, and both staffing needs and the curriculum for the program are being evaluated. For additional information, contact Keith at 509-335-4499 or blatner@wsu.edu.

WASHINGTON STATE UNIVERSITY

Policy Scoreboard

Editor's Note: To keep SAF members informed of state society policy activities, Policy Scoreboard is a regular feature in the Western Forester. *The intent is to provide a brief explanation of the policy activity—you are encouraged to follow up with the listed contact person for detailed information.*

Issues Persist With Revised O&C Lands Bill. In May, Oregon SAF (OSAF) sent a letter to Senator Wyden with comments about S1784, a bill introduced late last year to direct the management of BLM O&C lands that span about 2.4 million acres in western Oregon. Wyden's bill followed a similar one by Rep. Peter DeFazio (portions of HR1526) that passed the full House last September. Although OSAF has not taken a formal position on either bill, the letter expressed important concerns about S1784 from a professional perspective. In July, just prior to Congress' summer recess, Sen. Wyden introduced a revised version (S2734) of his earlier bill to the Senate Finance Committee, a strategy that takes advantage of his new chairmanship of that committee. Because issues of concern in the earlier bill generally persist in S2734, OSAF likely will submit related comments to Sen. Wyden's office before Congress reconvenes in early September. Among the key issues are highly prescriptive constraints that include age-based restrictions on cutting of individual trees, which would micromanage forestry unlike any other technical profession in the US, create new opportunities for legal challenges, and become a "lock with no key" in areas where trees pass the age limits prior to harvest. The text, current status, and other background on these bills can be found at www.congress.gov, www.wyden.senate.gov, and http://defazio.house.gov/. Contact: Paul Adams, OSAF Policy chair, 541-737-2946; paul.adams@oregonstate.edu.

OSAF Submits Comments to Board of Forestry on Riparian Rulemaking. In early 2012 the Oregon Board of Forestry initiated a process to review and possibly revise the riparian requirements for shade on small and medium fish-bearing streams on private forestlands. The decision followed a study that showed the current requirements in some cases led to post-harvest stream temperature increases that exceeded the state's cold water standard. The rulemaking process has extended well beyond the original target schedule due to technical complexities and issues highlighted in a board workshop on June 23. Just prior to the workshop, OSAF sent a letter to the board that pointed out the general effectiveness of the current riparian rules, the lack of evidence of significant impacts to fish under those rules, and how the cold water standard inadequately accounts for natural variability and aquatic productivity. The letter encouraged the board to proceed with caution and to consider voluntary measures and rule refinements that would provide flexibility in addressing site-specific conditions and concerns. Comments by board members at the end of the June 23 workshop showed recognition of many of the complexities and issues in forest stream protection, and that they may avoid a broad, one-size-fits-all policy approach. Background materials and presentations from the June 23 workshop and other board meetings that include riparian rule discussions can be found via links at www.oregon.gov/ODF/pages/board/index.aspx. Contact: Paul Adams, OSAF Policy chair, 541-737-2946; paul.adams@oregonstate.edu.

Wildfire Policy.

Item 1. SAF's Wildland Fire Management position statement. In June 2014, SAF Council approved a position statement (www.eforester.org/fp/Wildland_Fire_Management_June 2019.pdf) that incorporates the best parts of the previous expired statement and the Cohesive Strategy that President Clinton ordered in 2000, and Congress mandated that the fire agencies update in 2009 because it wasn't very effective. The key goal of the Cohesive Strategy is to restore resilient landscapes, and US Forest Service Chief Tom Tidwell is on record many times in the past several years saying that the agency wants to accelerate restoration activities. Congress, however, seems reluctant to provide increased budgets for active management, and, perversely, may be resigned to the "fire borrowing" situation as better than capitulating to partisan adversaries. See August 9 op-ed in Spokesman-Review: "Preventative measures can reduce size of wildfires" (http://bit.ly/VcIIBg).

Item 2. US wildfire policy is a "muddled mashup." Professor Steven Pyne, who has written many books about wildfire, recently wrote that the western wildfire situation cannot improve under the current “muddled mashup” called wildfire policy. He sees no hope for reducing the fuel loads on public lands that mega-fires feed on, and offers the suggestion that “box and burn” be the new strategy. As in the past, he is silent about how the “muddled mashup” policy might be improved to reduce fuel loads. He has nothing to say about the Cohesive Strategy (www.slate.com/articles/technology/future_tense/2014/07/box_and_burn_the_future_of_u_s_wildfire_policy.html).

Item 3. Do we need another committee to guide Cohesive Strategy implementation? The Cohesive Strategy is silent on whether policy changes are needed to create resilient landscapes. Fire agency leaders have signed off on the Cohesive Strategy that took five years to complete (in 2009 Congress gave them one year to do it). Now that it’s implementation time, fire agency leaders want to form yet another committee. One agency leader says fire management is everyone’s business. If that is so, then no one can be held accountable. That’s no way to run a business, but instead follows fire management traditions of giving agencies whatever they say they need no matter what it costs. To follow Cohesive Strategy developments, subscribe to the Western Region Strategy Committee (WRSC) newsletter (sign up at http://forestsandrangelands.gov/strategy/Regional_Strategy_Committees/West/index.shtml).

Item 4. Resilient landscapes need to be actively managed. When can we expect action to treat the hazardous fuels on federal lands that feed mega-fires? Likely not until there is land and resource management policy reform—NEPA, NFMA, and FLPMA. The Cohesive Strategy is not, and likely will not be, the vehicle for federal land management policy reform. Federal land management agencies make little or no effort to include fire management in the long-range comprehensive plans that NFMA and FLPMA require. Why? Fire-flame managers (as contrasted with fire-fuel managers) understandably prefer to work outside restrictive NFMA/FLPMA plans. They have their hands full dealing with mega-fires. The last thing they want to do is costly and time-consuming NEPA analysis. But aren’t fire suppression activities on federal lands “major” federal actions? Of course they are. So how do fire-flame managers get a pass on NEPA? Can’t fire-fuels managers get the same pass on NEPA that fire-flame managers get? Expand categorical exclusions! Seems like we ought to be doing something about those fuel loads instead of just waiting for them to ignite. See Item 1 above and get on with it. Don’t settle for the federal agencies’ excuses why they can’t do active management. Instead, help them do what needs to be done to overcome the real and perceived barriers to active management. If foresters won’t do it, then who will? Contact: Jay O’Laughlin, IESAF Policy chair, 208-885-5776; jayo@uidaho.edu.

WSSAF Update. Jocko Burks has completed a second draft version of a position statement on Management of National Forests in Washington State. Since this is a very active political issue, we are giving this statement special attention and review. Ellie Lathrop is taking the lead developing a one-day Working Forests Workshop planned for November 12 in Lacey, Wash. The target audience is people who make policy decisions in the legislature, congress, state and federal agencies, land trusts, county governments, and other areas. The program will include speakers on scientific topics regarding management of working forests and timberland managers ranging from small forestland owners to tribal and federal timberland managers. Harry Bell is representing WSSAF on the Olympic Peninsula Collaborative (OPC). The OPC is a multi-stakeholder effort to increase timber harvest on the Olympic National Forest and within the constraints of the Northwest Forest Plan. Contact WSSAF Policy Chair Harry Bell at harry@greencrow.com for more information. ◆

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